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REVIEW & FORECAST

EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MAY 28, 1980 • VOL.15,NO.23,24 P.J. McGOVERN,PUBLISHER

More Impervious to Recession Than in 1974

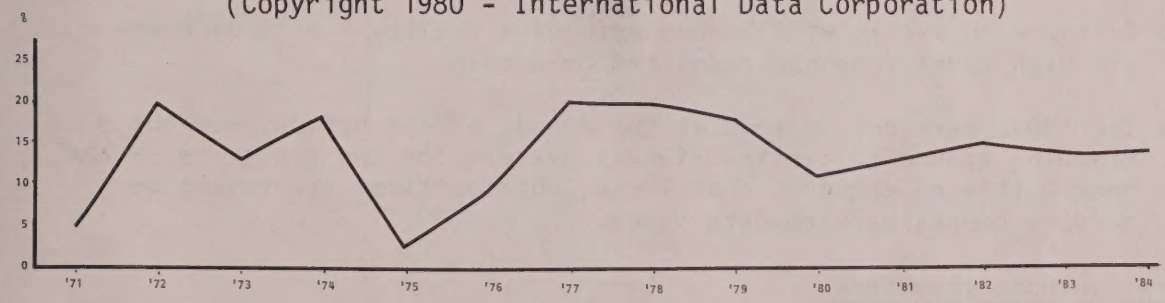
SHIPMENTS TO SUSTAIN 10%+ GROWTH DESPITE ECONOMY; EASE OF USE AND SOFTWARE REPLACE PURE SPEED AS KEY CRITERIA

Thanks in part to a growing diversity, computer shipments will set the pace for relatively smooth computer industry sailing through the recession that appears to have received official recognition from the Rose Garden. International Data Corp., publisher of EDP/IR, sees computer system shipment dollar value growth dipping from the 20% plateau of the last few years to the 11% level in 1980 and then climbing to a steady 13% or 14% rate for mid-decade.

Whereas the value of general purpose computer shipments accounted for 90% of industry shipments in 1974, that figure will be less than half by 1984. The booming areas of small business and desktop, along with minis, will bolster the overall shipment growth rate. Thus the recession roller coaster ride gets smoother as the industry gets larger and more diverse.

To some, 1979 represents a logical evolution in the annals of the computer industry. To others it marks a watershed year when the name of the game, hardware, was replaced by software.

Software unbundling is being propagated by vendors for economic reasons, but the fact remains that what makes the difference to many users is the soft-



The value of shipments will grow from $12 billion in 1974 to $42 billion in 1984. Shipments here include general purpose, minis, small business and desktops. The growth rates are taken from the summary table on page 12.

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ware and how easy the system is to use. Presented with the dilemma of higher service costs and lower hardware prices, the vendors turned to software, the growth area of the 80s, to rescue their bottom lines. The economic effects of the unbundling move are too soon to view; all mainframers except NCR showed a smaller percentage revenue growth this year than last.

During 1979, several trends became apparent as the industry put another year under its belt.

- Improved price/performance was the byword, as vendors of not only micros and minis but mainframes tumbled over themselves to revamp their product lines, following IBM's lead with its 4300s.

- Ease of use began to replace price as the key factor in market elasticity. And the small business computer market boomed.

- Data processing is old hat; information processing is de rigeur. Hence the rage for word processing capabilities and, along with that, electronic mail and document distribution.

- Improving bottom lines became trickier. Not only was there a glitch in the heretofore smooth decline in component prices, but the personnel intensive arenas of sales and support became a larger part of the pie. Also, users hesitated ordering, hoping that IBM's forthcoming H would offer better price/performance than the 303X.

- The channel of distribution is one of the key challenges facing vendors in the '80s -- witness retail stores and orders by phone.

- The passion for networking, both local and remote, is rapidly mounting. But here again, the determining factor of its success will also be software, as in data base management and compatibility of operating systems. Local loops are getting hot. Xerox, DEC and Intel are collaborating to propose a standard based on Xerox's Ethernet that could link unlike systems. Zilog announced Z Net at NCC and IBM has its own. With the local networking fad comes a trend that involves per-person CPUs with shared resources.

- Software on a chip will become more of a reality. Already there are high level language compilers on a chip.

- The '80s, heralded by some as the decade of the office, are but a training ground to create friendly systems for the real race -- the home. It's no accident that large, outside firms are buying up service companies with data bases.

General purpose computers

The general purpose market shows many signs of maturing. For instance, hardware no longer is seen as the primary source of future revenue -- witness the general trend toward unbundling of system software and also the various pricing schemes for maintenance.

Fueled by the 303X series, the value of 1979 general purpose shipments by U.S. manufacturers rose 11% to $15.8 billion, although GP shipments were

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WORLDWIDE INSTALLED BASE 1979-1984
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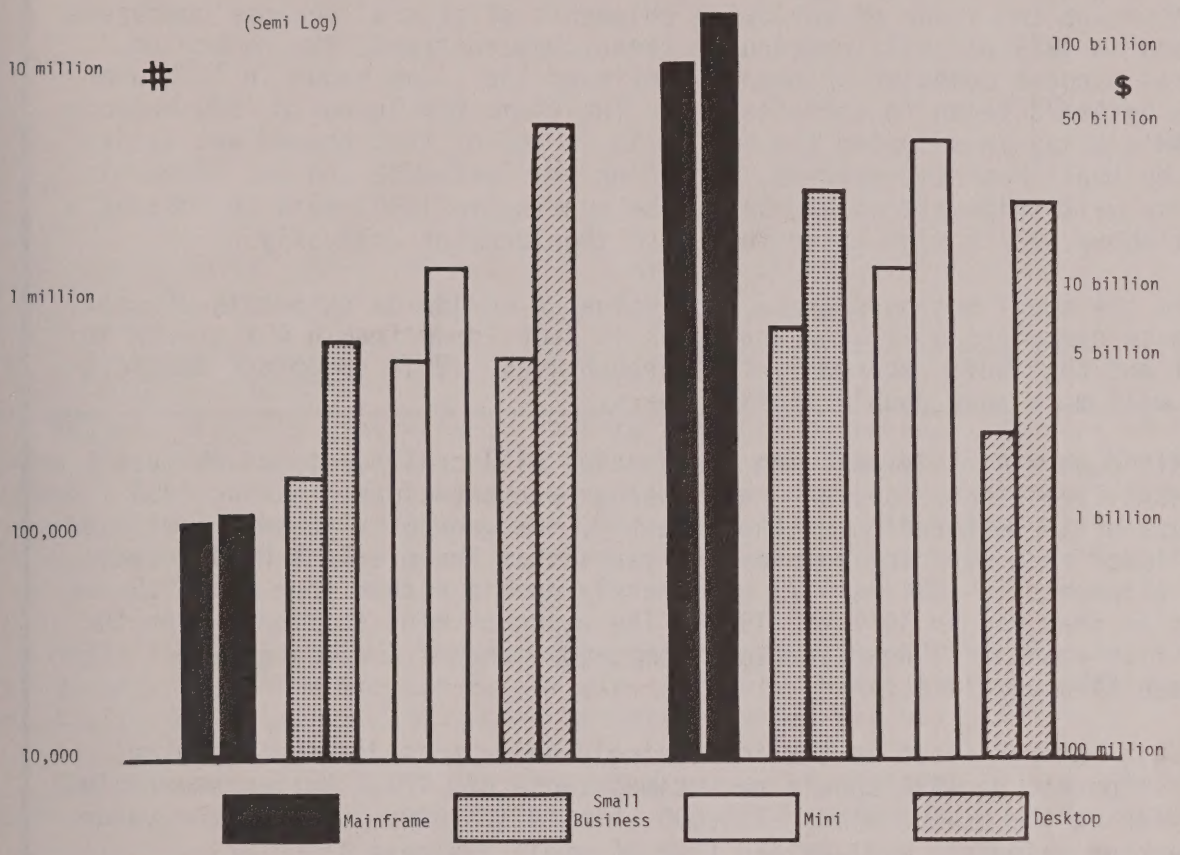

WORLDWIDE REVENUES TO U.S. MANUFACTURERS
BY INDUSTRY SECTOR
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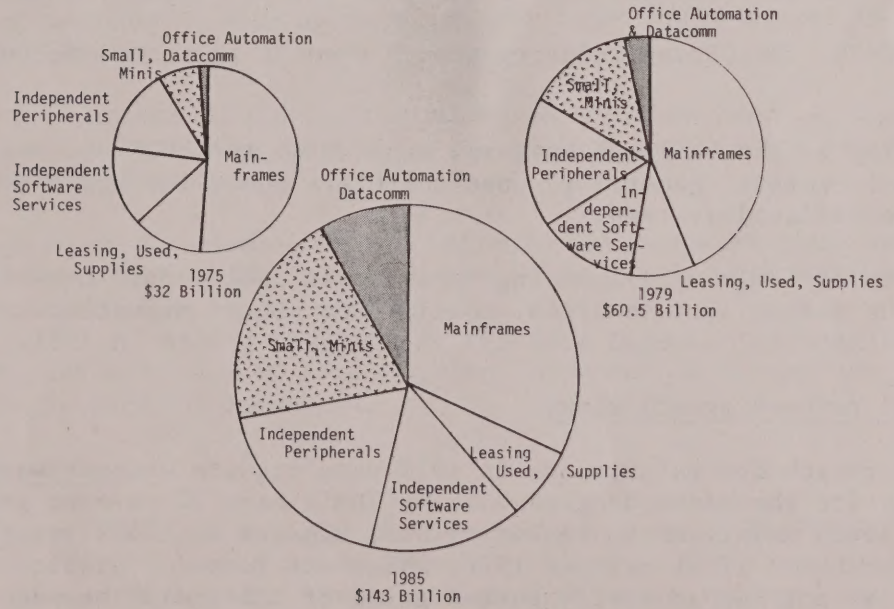

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In a Nutshell

Although the value of worldwide shipments of general purpose computers climbed in 1979 and will continue a steady upward trend, the number of general purpose computer shipments continued the slump begun in 1978 when IBM's System/3 began to show its age. The slump continued in 1979 because of IBM's delay in shipping the System/38. Much of that demand was satisfied by small business systems, including the System/32 and 34. General purpose unit shipments should be on the upswing in 1980, peak in 1981 at a point above 1977's high water mark, and then decline gradually.

In the small business arena, the value of worldwide shipments of small business computers will grow about 15% in 1980 (down from a 45% growth in 1979) and then hover at nearly 20% through 1984. Unit shipments and revenues will more than double in five years.

Although mini shipments and their value will continue to climb over the next five years, they show a slower growth anticipated during 1980. Because of the maturation of the industry, the growth in shipments will be at a lower rate over the future five years than the previous half decade. Unit shipments in 1984 vs 1979 will merely double rather than grow 2.5 times as they did in 1979 vs. 1974. The value of mini shipments over the next five years will nearly triple compared with a 3.5 times growth between 1979 vs. 1974.

Last but not least is the increasingly ubiquitous desktop computer; unit shipments by 1984 should be 5 times those of 1979. Not unremarkable considering there were almost 300,000 shipped in 1979. By 1983 the value of desktop shipments will exceed that of small business computers.

somewhat lower than IDC had anticipated. Shipments of medium size systems were not very strong because of the pause caused by the introduction of the 4300 series, but activity in this area should be especially strong in 1980.

During 1979, IBM slowed industry growth when it postponed delivery of the System/38.

Reflecting growth in large systems, especially the 303X series, the number of U.S. manufacturers' general purpose computers installed worldwide dropped as users consolidated systems.

Shipments of IBM's 4331-2 coming onstream in 1981 should create some growth in the medium systems arena, mostly from upward migration. Likewise, the expected IBM 4351 (dubbed 4341-2?) should spur growth in 1981.

Mainframers' revenue growth slows

Revenue growth for mainframers in 1979 wasn't quite what it was in 1978, with results for the group dragged down by IBM's mere 7% revenue growth. As a group, the seven mainframers, including DEC, managed an 11.3% growth in 1979 compared with their 17.6% gain in 1978, which was indeed a stellar year. The mainframers as a group generally posted gains of 12%-to-13% between the years 1975 and 1977.

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INFORMATION PROCESSING REVENUES -- LEADING MANUFACTURERS
(Million Dollars)

	1974	1975	1976	1977	1978	Δ 78-79	1979
IBM	10,510	11,850	13,400	14,765	17,074	7	18,338
NCR	1,122	1,415	1,674	1,944	2,240	17.5	2,634
Burroughs	1,293	1,457	1,612	1,794	2,083	14	2,376
Univac	1,294	1,433	1,467	1,726	2,050	13	2,316
CDC	1,101	1,246	1,358	1,513	1,868	21.7	2,273
DEC (6/30)	422	534	736	1,059	1,437	25.5	1,804
HIS*	856	856	914	1,037	1,294	12.3	1,453
TOTAL	16,598	18,791	21,161	23,838	28,046	11.2	31,194

*Excludes Cii-Bull

NCR was the only manufacturer posting a higher percentage increase in revenues for 1979 than for 1978 -- all the others' results were somewhat abated. However, despite this fact, there were still some very hefty gains in terms of revenues. DEC rose 25%, followed by CDC with 21%, and NCR weighed in with 17.5%. Both HIS and IBM showed revenue percentage gains about half of what they were in 1978.

While the seven makers' combined revenues topped the $30 billion mark for the first time, IBM's portion of the pie continued to decline to 58.8% compared with 64.3% back in 1973, when antitrust suits were being filed.

The slower pace of growth in the mainframers' revenues as well as the fact that user budgets grew faster than did mainframers' revenues point to trends:

- Mainframes account for less of the total spending picture than they have previously.
- Mainframers were caught in the frenetic race to improve price/performance. (And there were some hiccups in the smoothly declining prices of components such as memories and logic chips caused by supply and demand.)
- The reactive stance of unbundling more operating software as well as applications software is too new to reflect significant results for vendors of their size.
- Mainframers are not immune to the inflationary costs of personnel -- machines in 1979 still required people to build, sell and fix them. However, times are changing.

How significant a role each factor played in creating the softer picture for 1979 growth is hard to determine.

Mainframers in review

- Burroughs -- 1979 was notable for the introduction of the B900 family; the company enters 1980 with a record backlog of orders for these systems. Burroughs opened up the door to communication with other vendors' equipment with its CP 9400 and 9500 communications processors. The Motown maker kept

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up its courtship with banks via its BMT Series of modular terminals whose components can be intermixed, and remote teller machines.

Although Burroughs continues to acquire the pieces required to implement an integrated approach to the office automation phenomenon, it has lacked new products. In 1979 it acquired Context Corp., thus adding OCR capability.

Burroughs' revenue from software and services rose 45% during 1979, and the company expects continued expansion. Revenues from the large and medium systems portion of business grew 15.1% to $1.17 billion while small systems and office automation products grew 12.9% to $545.1 million.

• Control Data Corp. managed an astounding 71.4% growth in its computer business earnings on a 21.7% rise in revenues for that portion of its business. Overall, its computer businesses accounted for 57% of its 1979 earnings. Backlogs also set records.

CDC's peripheral business has been growing, and appears to be the star in 1979. Revenues from sales to OEMs grew 41% during the year. CDC's five year picture of revenue contribution of its three sectors shows that services holds a steady 39%-to-40% share, while peripheral products grew from 26% in 1975 to 40% in 1979 and systems dropped from 35% to 21%.

Although CDC has the former Service Bureau Company pumping away producing revenues, it has not muttered any plans to enter networking, as Tymshare has. CDC, with its Plato, has done some homework for the home market.

• Honeywell modernized its existing product line with some systems oriented toward distributed processing, the DPS 7 and 8, and brought out a new version of an operating system for its Xerox base. Shipments of its Level 6 mini were presumably strong, as the year before HIS had garnered several large contracts. In addition, Honeywell started to integrate Incoterm's product lines into its offerings, and devised a factory management system based on Level 6s and Incoterm terminals.

Honeywell Information System's operating profit rose 43% during 1979 to $152 million. HIS likes to include revenue contributions from its 47% share of Cii Honeywell Bull. The combined revenues in 1979 totaled $2.5 billion.

• IBM was almost more interesting for what it didn't do than what it did do. It didn't ship its System/38; it apparently didn't make enough 16K RAMs as it contracted for huge quantities from semiconductor houses and Japan Inc., thus drying up the supply. It also didn't unveil a bigger faster disk for its large systems and it didn't say anything about H.

IBM did begin shipping its 4300s, further unbundled operating software for the 4300, separated charges for software and hardware maintenance, announced a midlife kicker to the 303X series in the 3033N, and set the trend by raising prices for maintenance and many products. GSD got in some interesting jabs with its 5280, which some call the little brother to the 8100. Then GSD crossed into OPD's territory with the 5520 document distribution system. IBM also blessed color terminals and graphics, and even consented to make an Ascii terminal, which it sells via phone. Branching out still further, IBM made a deal that gets it into the videodisk arena -- a nice link for IBM's plans for the home market.

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IBM was taken off the hook temporarily in some antitrust suits, such as the one filed by Transamerica Corp., but the Big One still drones on, although IBM and the Justice Department have actually been talking about settlement.

IBM's offspring, Satellite Business Systems, got the go ahead and plans to launch into orbit October 23. In the meantime, that whole deal is looking more and more like a logical piece of the whole SNA-SDLC womb to tomb offering users have come to expect from Big Blue.

• NCR in 1979 demonstrated it wants to be considered a supplier of a full range of systems. It announced the V-8500M and MP families and the V-8455, thus jumping into the price and performance arena of IBM's 4300s. It also beat Memorex to the draw and walked away with Comten Corp., maker of communications front ends. Although Comten is continuing business as usual, NCR is already using Comten's knowhow to revamp its networking plans, probably with an eye toward IBM compatibility. During the year, NCR took the first step to become more independent of its general purpose terminal suppliers, and announced the 7900 general purpose terminal.

NCR's shipments of 8100s in the small business arena were very strong, nearly doubling its installed base.

• Sperry Univac's revenues topped the $2 billion mark; since 1969 its revenues have grown at an annual compound rate of 14%. Bookings and shipments also rose over the $2 billion mark. An immediate hit was its 1100/60, introduced last June, for which the company booked more than 160 systems prior to year end. The multi-microprocessor based 1100/60 spans the performance range from the 1100/10 to the 1100/80, superceding the 1100/10, 20 and 40.

Univac also introduced the Distributed Communications Processor/40 (DCP/40) that will link Univac and non-Univac systems and the Manman manufacturing software for its V77 minis.

Small business computers

Small business computers really had a bonanza year in 1979, with worldwide unit and dollar value of shipments by U.S. makers growing over 42% compared with 1978. The boom during 1979 far exceeded IDC's year-ago projections of 22% as the year stole pent-up demand from 1978 and some anticipated demand from 1980. IDC estimates about 2,000 installations during 1979 were defectors from the aging IBM System/3 base. When IBM starts shipping its 38 this summer, the scene may change. During 1979, IBM shipped 17,500 System/34s, which are small business computers.

Perhaps in part because of the boom in 1979, the recession, and manufacturers' struggles for production capacity, there will be a glitch in the shipment growth rate during 1980. In addition, the distribution network is still being set up in the U.S. Despite the glitch, shipments will rise 17% in units during 1980 with a 15% rise in value to nearly $3 billion.

During the next five years, the worldwide annual compound growth rate of unit shipments should settle at 18.5%. Between 1979 and 1984 the volume of shipments should more than double to 140,400 units. However, the small business market may find increased competition from the desktop vendors, which are adding large disks to their systems.

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WORLDWIDE SMALL BUSINESS COMPUTER SHIPMENTS 1979

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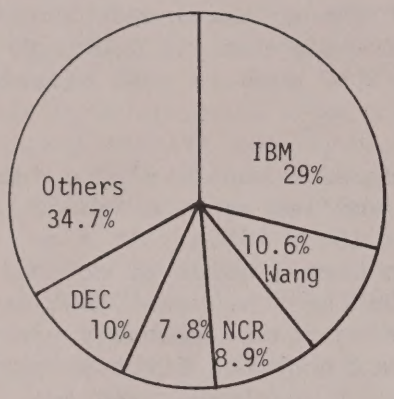
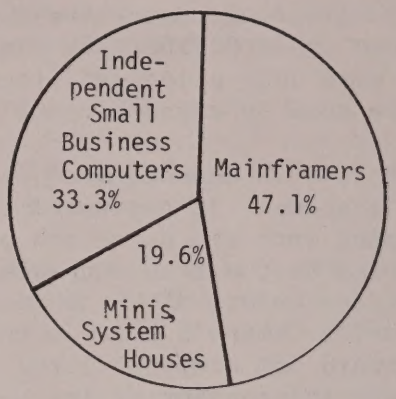


60,200 Units



60,200 Units

There are several sources of small business computers: mainframers offering products such as IBM's System/32 and 34, Burroughs' B80 and 800, NCR's 8100 and 8200; minicomputer vendors both through their own systems such as DEC's Datasystems, Data General's CS, Microdata's Reality, and through systems houses. There are also independents which make their own CPUs, such as Basic Four and Wang.

Mainframers as before grabbed the lion's share of small business shipments. NCR had the highest growth of this group; it nearly doubled its base of small business computers. The quiet Dayton manufacturer's shipments grew from 2,645 units in 1978 to 5,400 units worldwide in 1979. Most of the growth stemmed from the 8100 and 8200 series. Basic Four came next in terms of growth, posting a 49% increase in shipments, with 2,810 units shipped in 1979. IBM had a 35% growth with its System/34. Wang was quiet last year as it geared up for its recently announced 2200s, the SVP and LVP.

Minicomputers

The value of minicomputer shipments will grow 21% in 1980, in large part because the steadiness of the commercial sector's demands, primarily for superminis, should compensate for a relatively poor year of OEM business. The growth rate of shipment value, after its dip from 28% in 1979 to 21% in 1980, should rebound to the 26% area in 1981, when the OEM recovery should start early in the year. By 1982, commercial growth should be stronger than OEM.

Superminis, admittedly growing from a smaller base than the traditional mini, will continue to be the growth star in number of units shipped as well as value of shipments. During 1980, IDC sees unit shipment growth rates of microminis slowing to 17%, traditional minis falling to 6%, but superminis holding at 28% growth compared with 1979 figures.

Looking at the total mini picture, the number of minis shipped worldwide by U.S. makers should rise only 13% during 1980 compared with 18% last

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year. But by 1981, growth will pick up to 20%, aided by orders of previously postponed equipment. Over the next four years, unit shipments should grow at about the same compound rates both in the U.S. and internationally.

The mix of mini revenues is changing, as the companies find themselves in an era in which they have more responsibility to support the customer. Thus revenues from service and software are accounting for a larger share of total revenues than previously. By 1984, the mini industry should receive about 39% of its revenues from these two sectors compared with 30% in 1979.

IDC classifies minis as: micromini, which competes with the DEC LSI-11; traditional mini; and supermini, which competes with DEC's 11/44 and above.

Looking at the industry by segments, micromini unit shipments should remain at a steady 17% growth rate in 1980 and then jump to 29% in 1981. 1979's 17% growth can be explained by the precautionary attitude of the OEM market that didn't want to be caught with excess inventory. The micromini's average value will hold constant at between $2,800 and $3,000.

The traditional mini market should be looked at in terms of IBM and the rest of the world. During 1979, the growth rate of U.S. makers' unit shipments was bolstered to 16% because of IBM's Series/1 150% growth. But the industry growth rate should drop sharply to 6% for 1980, climb slightly to 9% in 1981 and then settle down to around 6% or 5%, reflecting in part the maturation of the market. Average system values should continue to grow. IBM's 1979 shipments amounted to 10.5% of the industry's 66,200 units.

IBM in the mini market has been slow to find many good OEM channels but it is proving adept at selling the unit in special applications entailing custom systems, such as supermarket energy management and distributed systems for a life insurance company. However, the Series/1 is fast aging and unless the price starts dropping could have trouble being seriously competitive. Another possibility is that IBM will update the product.

The supermini arena has been heralded as the growth area and where the bucks are. IBM has to be seriously considering entering this market. If it enters, IDC's projections may be low. But supermini unit shipments didn't grow as fast in 1979 as IDC had projected, only 28% compared with 1978's 30%.

Why didn't superminis take off as expected? Scientific markets generally grow quickly initially and many superminis were originally targeted for this market, not for the commercial sector. For instance, DEC's VAX won't have 32-bit Cobol and some easier file handling facilities until this fall. And DG's MV8000 lacks 32-bit Cobol. Also, commercial users were in a holding pattern after IBM's 4300 changed the price/performance scale.

But in 1980, these users should get off the fence. In addition, the 4300 concept will create additional demand. And there are more superminis courting the commercial market.

By 1981, unit shipments of superminis should rise 34% and thereafter decline slightly. The average system value of superminis will continue to grow from $77K in 1979 to $90K in 1984 as users want increasing capabilities. Thus the value of supermini shipments should quadruple between 1979 and 1984, from $1.3 billion to $5.3 billion.

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Desktop computers

The desktop computer segment was the fastest growing in terms of unit shipment growth during 1979. Defined by IDC by hardware parameters rather than the markets in which they might be placed, these systems are microprocessor based systems, not kits. They have at least a Basic or Basic-like language; can attach peripherals such as a disk and printer; are related to a system with an entry level price under $10,000; and are targeted for end use in scientific, business, educational, home and hobbyist environments. Some examples are: Apple, Tandy TRS 80, and Commodore at the low end and IBM 5120 and HP 9800 at the high end.

Desktop computer unit shipments of U.S.-based manufacturers should grow five-fold between 1979 and 1984, from 299,000 to 1.5 million, thus outstripping all other sectors in shipment growth. The projections assume that U.S. vendors can maintain their competitive activity in the rest of the world, despite Japanese fascination with the low end market. However, if desktops can become truly user friendly, then these projections may be quite low.

IDC projects the business/professional arena will continue to be the strongest growth area in both the U.S. and international markets. For instance, the compound growth rates in the U.S. are: business/professional, 42%; home/hobby, 25%; scientific, 30%; educational, 19%. IDC includes engineering as part of the scientific market.

Desktops are already beginning to encroach the small business computer's territory, and more battles can be expected when the desktops acquire the 8 inch mini Winchester disk, a data base management system, and Query-type language. For instance, Hewlett-Packard has put a version of its Image data base management system and a Query on its 9845. And units in the business environment are increasingly being used to handle word processing as well as DP.

The forecast assumes 1980 dollar value of systems throughout, with the prediction that vendors will provide enhancements rather than cut the costs dramatically.

Software and services

Companies in the services market spend much of their time being acquisition targets, primarily of firms outside the computer industry. With compound growth rates from 1979 through 1984 about 19% to 23% for the remote problem solving and autotransaction areas, respectively, small wonder this sector of the market looks attractive to outsiders.

Some soothsayers see few if any independent services firms left by the end of the decade. If one looks at a 1990 scenario, the new players will reflect courtship of the home market and its desire for data bases. Some examples of companies that have recently bought into the industry via the firms in parentheses: American Express (First Data Resources), McGraw-Hill (Data Resources Inc.), and Dun & Bradstreet (NCSS).

Revenues generated by the independent software market will almost triple between 1979 and 1984, with a jump from $1.67 billion to $4.54 billion. And these figures do not reflect the revenue from software pouring in to system vendors or to systems houses.

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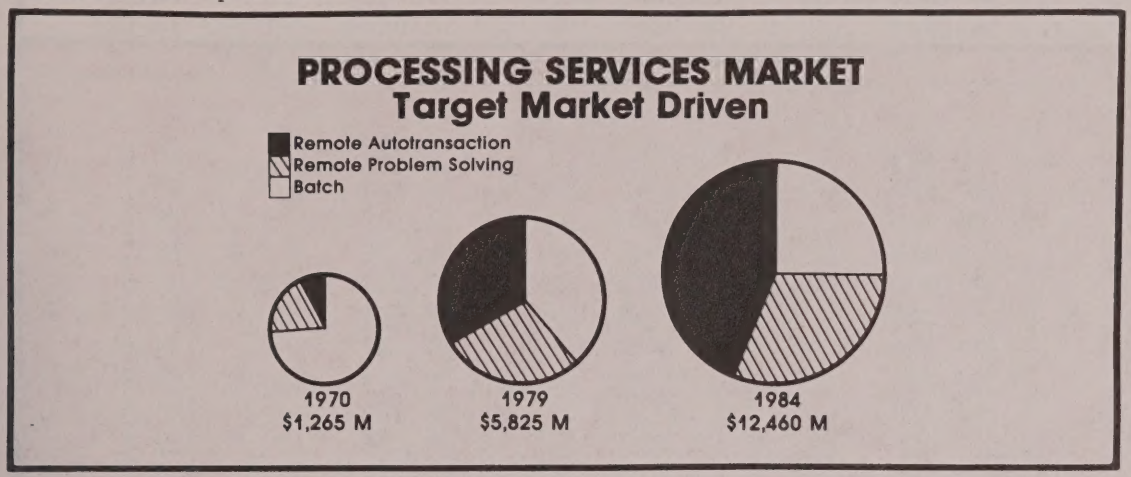
Most of the growth will come in the packaged software sector. Emerging areas are graphics, office automation and forecasting/modeling. Because IBM is unbundling, and thus raising its price floor, independents are expected to also raise their prices.



Remote autotransaction involves services of a repetitive, clerical nature such as standard accounting. In 1979, remote problem solving, which includes the traditional plain vanilla T/S as well as sophisticated applications, saw general business and administrative applications generate more revenue than scientific and engineering applications. The remote data base services sector has grown from $55 million in 1970 to $570 million in 1979 and will continue at well over 20%, reaching $1 billion to $1.5 billion by 1984. The largest target market will eventually be the consumer.

Distributed data processing

Distributed data processing (DDP) seems to have moved out of the conceptual womb into reality. Several sectors of the industry are actively marketing DDP. These include clustered processing terminals, such as Datapoint and Four-Phase; minicomputers; small business computers; and some mainframes. The U.S. installed base in 1979 hit $2 billion and should grow six-fold to $12 billion by 1983. Processors at operating nodes within DDP networks should number about 220,000 in the U.S. by the end of 1983.

Minis will lose their predominant (57%) share of the installed DDP base by 1984 when they will have 45% of the pie; clustered processing terminals will jump from 34% to 46% while small business computers remain at 9%.

• Inflation -- The value of computer system shipments shown in the Review and Forecast pages (Red) represents the price of equipment at the time of sale, i.e., the shipment values are in "current" dollars. Any "inflation" is included in the values shown. Computer system prices have, in fact, decreased over time for a given amount of computing power, and can thus be considered to have been deflationary rather than inflationary. But inflation has taken its toll by lessening the amount of price decreases. IDC expects the effects of inflation on computer prices to be only slightly higher (less than 1% annually) over the next five years than in the past five years, based on relevant economic indicators. This works out to about 7% a year for the future.

• Note -- The "Cumulative Number in Use" column accounts for retirements. The "Value in Use" column represents the if-sold value at the time of shipment.

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COMPUTER MARKET SUMMARY
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	70,350	269,690	$11,920	$ 58.5
1975	74,600	331,440	12,255	67.1
1976	104,040	412,530	13,329	76.7
1977	172,470	560,460	15,976	89.1
1978	321,910	861,320	19,152	104.6
1979	477,440	1,303,760	22,551	120.0
1980	652,400	1,916,800	24,942	138.6
1981	888,000	2,760,600	28,219	159.8
1982	1,182,800	3,895,100	32,392	184.4
1983	1,527,000	5,371,800	37,056	213.1
1984	1,903,100	7,218,400	42,118	245.9
		UNITED STATES		
1974	47,800	174,240	$ 7,096	$ 33.4
1975	49,800	213,640	6,678	37.9
1976	68,240	265,580	7,104	43.4
1977	118,080	364,820	8,878	50.4
1978	227,660	575,380	10,469	58.9
1979	313,960	862,440	12,243	66.7
1980	414,400	1,249,240	13,662	77.0
1981	551,000	1,769,640	15,592	88.9
1982	714,100	2,449,940	17,998	102.7
1983	896,300	3,311,240	20,581	118.8
1984	1,090,600	4,362,940	23,330	137.1
		INTERNATIONAL		
1974	22,550	95,450	$ 4,824	$ 25.1
1975	24,800	117,800	5,577	29.2
1976	35,800	146,950	6,225	33.3
1977	54,390	195,640	7,098	38.7
1978	94,250	285,940	8,683	45.7
1979	163,480	441,320	10,308	53.3
1980	238,000	667,560	11,280	61.6
1981	337,000	990,960	12,627	70.9
1982	468,700	1,445,160	14,394	81.7
1983	630,700	2,060,560	16,475	94.3
1984	812,500	2,855,460	18,788	108.8

This is the total of all general-purpose computers, minis, small business computers (SBCs), desktop computers, and "other" systems such as IBM's S/7. Minis used in SBCs are subtracted to eliminate double counting. Detailed tables follow (General-purpose, SBC, and desktop tables are mutually exclusive, but the minicomputer table includes computers subsequently shipped to users -- by the minimakers or by systems houses -- as small business computers.)

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GENERAL-PURPOSE COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	15,500	110,300	$10,600	$ 54.1
1975	13,500	114,100	10,610	61.2
1976	14,800	111,200	10,830	68.5
1977	17,800	111,500	12,500	77.7
1978	10,500	111,900	14,200	88.7
1979	9,000	103,000	15,800	97.9
1980	15,400	102,500	16,500	108.8
1981	18,300	105,100	17,300	119.9
1982	16,200	107,000	18,300	131.5
1983	14,300	109,400	19,300	143.5
1984	13,600	112,100	20,400	156.0
		UNITED STATES		
1974	8,600	61,500	$ 6,200	$ 30.2
1975	6,700	62,100	5,610	33.8
1976	7,200	59,600	5,530	37.9
1977	8,900	58,200	6,600	42.9
1978	4,500	57,900	7,300	48.6
1979	4,900	53,200	7,900	52.6
1980	7,400	52,800	8,300	58.1
1981	9,100	53,800	8,700	63.7
1982	8,000	54,400	9,200	69.5
1983	7,000	55,400	9,700	75.5
1984	6,600	56,600	10,200	81.7
		INTERNATIONAL		
1974	6,900	48,800	$ 4,400	$ 23.9
1975	6,800	52,000	5,000	27.4
1976	7,600	51,600	5,300	30.6
1977	8,900	53,300	5,900	34.8
1978	6,000	54,000	6,900	40.1
1979	4,100	49,800	7,900	45.3
1980	8,000	49,700	8,200	50.7
1981	9,200	51,300	8,600	56.2
1982	8,200	52,600	9,100	62.0
1983	7,300	54,000	9,600	68.0
1984	7,000	55,500	10,200	74.3

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SMALL BUSINESS COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	4,150	6,200	$ 200	$ 0.3
1975	10,600	16,800	400	0.7
1976	22,400	39,200	880	1.6
1977	33,500	72,700	1,300	2.9
1978	42,100	113,300	1,790	4.6
1979	60,200	169,100	2,610	7.0
1980	70,600	232,600	2,990	9.7
1981	85,200	308,400	3,610	13.0
1982	102,100	398,900	4,320	16.8
1983	118,600	504,900	5,140	21.4
1984	140,400	631,100	6,080	26.9
		UNITED STATES		
1974	3,000	4,500	$ 150	$ 0.2
1975	7,900	12,400	300	0.5
1976	14,800	27,200	580	1.1
1977	22,100	49,300	850	2.0
1978	26,400	74,200	1,140	3.0
1979	36,200	106,700	1,620	4.5
1980	41,800	143,500	1,840	6.1
1981	50,200	187,700	2,210	8.1
1982	59,800	240,500	2,630	10.4
1983	69,100	302,100	3,110	13.2
1984	81,100	374,900	3,650	16.5
		INTERNATIONAL		
1974	1,150	1,700	$ 50	$ 0.1
1975	2,700	4,400	100	0.2
1976	7,600	12,000	300	0.5
1977	11,400	23,400	450	0.9
1978	15,700	39,100	650	1.6
1979	24,000	62,400	990	2.5
1980	28,800	89,100	1,150	3.6
1981	35,000	120,700	1,400	4.9
1982	42,300	158,400	1,690	6.4
1983	49,500	202,800	2,030	8.2
1984	59,300	256,200	2,430	10.4

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MINICOMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	46,600	135,300	$ 930	$ 2.7
1975	48,600	181,400	1,155	3.8
1976	58,400	235,300	1,515	5.2
1977	82,000	311,200	2,055	7.0
1978	103,500	406,500	2,675	9.4
1979	122,000	517,000	3,430	12.6
1980	137,400	638,500	4,165	16.4
1981	164,600	783,800	5,265	21.2
1982	194,200	954,800	6,685	27.5
1983	226,200	1,153,600	8,260	35.1
1984	259,900	1,380,000	9,950	44.2
		UNITED STATES		
1974	33,900	96,100	$ 625	$ 1.9
1975	34,500	126,300	725	2.6
1976	42,000	162,300	970	3.4
1977	60,000	214,500	1,335	4.5
1978	72,200	276,800	1,715	6.0
1979	80,700	344,800	2,230	8.0
1980	89,300	419,600	2,655	10.3
1981	108,600	511,600	3,365	13.3
1982	129,300	621,100	4,275	17.2
1983	150,200	748,900	5,220	21.9
1984	171,500	894,000	6,250	27.5
		INTERNATIONAL		
1974	12,700	39,200	$ 305	$ .8
1975	14,100	55,100	430	1.2
1976	16,400	73,000	545	1.8
1977	22,000	96,700	720	2.5
1978	31,300	129,700	960	3.4
1979	41,300	172,200	1,200	4.6
1980	48,100	218,900	1,510	6.1
1981	56,000	272,200	1,900	7.9
1982	64,900	333,700	2,410	10.3
1983	76,000	404,700	3,040	13.2
1984	88,400	486,000	3,700	16.7

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DESKTOP COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	3,000	6,000	$ 40	0.1
1975	3,000	9,000	50	0.2
1976	12,000	21,000	150	0.3
1977	43,000	64,000	230	0.5
1978	172,000	236,000	756	1.3
1979	299,000	535,000	1,282	2.5
1980	444,000	979,000	1,929	4.5
1981	638,000	1,617,000	2,797	7.3
1982	892,000	2,509,000	3,959	11.2
1983	1,193,000	3,702,000	5,330	16.6
1984	1,519,000	5,221,000	6,815	23.4
		UNITED STATES		
1974	1,500	3,000	$ 20	$ *
1975	1,500	5,000	25	0.1
1976	7,000	12,000	80	0.2
1977	30,000	42,000	170	0.3
1978	129,000	171,000	495	0.8
1979	200,000	371,000	841	1.6
1980	285,000	656,000	1,240	2.9
1981	394,000	1,050,000	1,753	4.7
1982	530,000	1,580,000	2,400	7.0
1983	685,000	2,265,000	3,121	10.2
1984	849,000	3,114,000	3,881	14.1
		INTERNATIONAL		
1974	1,500	3,000	$ 20	$ *
1975	1,500	4,000	25	0.1
1976	5,000	9,000	70	0.1
1977	13,000	22,000	60	0.2
1978	43,000	65,000	261	0.5
1979	99,000	164,000	441	0.9
1980	159,000	323,000	686	1.6
1981	244,000	567,000	1,044	2.6
1982	362,000	929,000	1,559	4.2
1983	508,000	1,437,000	2,209	6.4
1984	670,000	2,107,000	2,934	9.3

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DESKTOP COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1974	2,000	3,000	$ 34	*
1975	4,000	7,000	50	$ 0.1
1976	12,000	19,000	170	0.2
1977	45,000	64,000	390	0.7
1978	173,000	237,000	744	1.4
1979	298,000	535,000	1,229	2.6
1980	445,000	980,000	1,971	4.6
1981	645,000	1,625,000	2,869	7.5
1982	891,000	2,516,000	4,010	11.5
1983	1,193,000	3,709,000	5,262	16.7
1984	1,519,000	5,228,000	6,885	23.6
		UNITED STATES		
1974	1,000	1,500	$ 17	*
1975	2,000	4,000	25	*
1976	7,000	11,000	90	$ 0.1
1977	28,000	39,000	220	0.4
1978	132,000	171,000	475	0.8
1979	200,000	371,000	758	1.6
1980	288,000	659,000	1,249	2.8
1981	392,000	1,051,000	1,713	4.5
1982	529,000	1,580,000	2,345	6.9
1983	685,000	2,265,000	3,048	9.9
1984	849,000	3,114,000	3,815	13.7
		INTERNATIONAL		
1974	1,000	1,500	$ 17	*
1975	2,000	3,000	25	*
1976	5,000	8,000	80	$ 0.1
1977	17,000	25,000	170	0.3
1978	41,000	66,000	269	0.6
1979	98,000	164,000	471	1.0
1980	157,000	321,000	722	1.8
1981	253,000	474,000	1,156	3.0
1982	362,000	936,000	1,665	4.6
1983	508,000	1,444,000	2,214	6.8
1984	670,000	2,114,000	3,070	9.9

COMPUTER MARKET SUMMARY
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1974	69,350	266,690	$11,914	$ 58.5
1975	75,600	329,440	12,255	67.1
1976	104,040	410,530	13,349	76.7
1977	174,470	560,460	16,136	89.2
1978	322,910	862,320	19,140	104.7
1979	476,440	1,303,760	22,498	120.1
1980	653,400	1,917,800	24,987	138.7
1981	895,000	2,768,600	28,291	159.9
1982	1,181,800	3,902,100	32,443	184.7
1983	1,527,000	5,378,800	36,988	213.2
1984	1,903,100	7,225,400	42,188	246.2
		UNITED STATES		
1974	47,300	172,740	$ 7,093	$ 33.4
1975	50,300	212,640	6,678	37.9
1976	68,240	264,580	7,114	43.4
1977	116,080	361,820	8,928	50.4
1978	230,660	575,380	10,449	58.9
1979	313,960	862,440	12,160 12466	66.6
1980	417,400	1,252,240	13,671 13,68	76.9
1981	549,000	1,770,640	15,552	88.7
1982	713,100	2,449,940	17,943	102.5
1983	896,300	3,311,240	20,508	118.5
1984	1,090,600	4,362,940	23,264	136.9
		INTERNATIONAL		
1974	22,050	93,950	$ 4,821	$ 25.1
1975	25,300	116,800	5,577	29.2
1976	35,800	145,950	6,235	33.3
1977	58,390	198,640	7,208	38.8
1978	92,250	286,940	8,691	45.8
1979	162,480	441,320	10,338	53.5
1980	236,000	665,560	11,316	61.8
1981	346,000	997,960	12,739	71.2
1982	468,700	1,452,160	14,500	82.2
1983	630,700	2,067,560	16,480	94.7
1984	812,500	2,862,460	18,924	109.3

This is the total of all general-purpose computers, minis, small business computers (SBC), desktop computers, and "other" systems such as IBM's S/7. Minis used in SBCs are subtracted to eliminate double counting. Detailed tables follow (General-purpose, SBC, and desktop tables are mutually exclusive, but the minicomputer table includes computers subsequently shipped to users -- by the mini makers or by systems houses -- as small business computers.)

GENERAL-PURPOSE COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	15,500	110,300	$10,600	$ 54.1
1975	13,500	114,100	10,610	61.2
1976	14,800	111,200	10,830	68.5
1977	17,800	111,500	12,500	77.7
1978	10,500	111,900	14,200	88.7
1979	9,000	103,000	15,800	97.9
1980	15,400	102,500	16,500	108.8
1981	18,300	105,100	17,300	119.9
1982	16,200	107,000	18,300	131.5
1983	14,300	109,400	19,300	143.5
1984	13,600	112,100	20,400	156.0
		UNITED STATES		
1974	8,600	61,500	$ 6,200	$ 30.2
1975	6,700	62,100	5,610	33.8
1976	7,200	59,600	5,530	37.9
1977	8,900	58,200	6,600	42.9
1978	4,500	57,900	7,300	48.6
1979	4,900	53,200	7,900	52.6
1980	7,400	52,800	8,300	58.1
1981	9,100	53,800	8,700	63.7
1982	8,000	54,400	9,200	69.5
1983	7,000	55,400	9,700	75.5
1984	6,600	56,600	10,200	81.7
		INTERNATIONAL		
1974	6,900	48,800	$ 4,400	$ 23.9
1975	6,800	52,000	5,000	27.4
1976	7,600	51,600	5,300	30.6
1977	8,900	53,300	5,900	34.8
1978	6,000	54,000	6,900	40.1
1979	4,100	49,800	7,900	45.3
1980	8,000	49,700	8,200	50.7
1981	9,200	51,300	8,600	56.2
1982	8,200	52,600	9,100	62.0
1983	7,300	54,000	9,600	68.0
1984	7,000	55,500	10,200	74.3

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SMALL BUSINESS COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	4,150	6,200	$ 200	$ 0.3
1975	10,600	16,800	400	0.7
1976	22,400	39,200	880	1.6
1977	33,500	72,700	1,300	2.9
1978	42,100	113,300	1,790	4.6
1979	60,200	169,100	2,610	7.0
1980	70,600	232,600	2,990	9.7
1981	85,200	308,400	3,610	13.0
1982	102,100	398,900	4,320	16.8
1983	118,600	504,900	5,140	21.4
1984	140,400	631,100	6,080	26.9
		UNITED STATES		
1974	3,000	4,500	$ 150	$ 0.2
1975	7,900	12,400	300	0.5
1976	14,800	27,200	580	1.1
1977	22,100	49,300	850	2.0
1978	26,400	74,200	1,140	3.0
1979	36,200	106,700	1,620	4.5
1980	41,800	143,500	1,840	6.1
1981	50,200	187,700	2,210	8.1
1982	59,800	240,500	2,630	10.4
1983	69,100	302,100	3,110	13.2
1984	81,100	374,900	3,650	16.5
		INTERNATIONAL		
1974	1,150	1,700	$ 50	$ 0.1
1975	2,700	4,400	100	0.2
1976	7,600	12,000	300	0.5
1977	11,400	23,400	450	0.9
1978	15,700	39,100	650	1.6
1979	24,000	62,400	990	2.5
1980	28,800	89,100	1,150	3.6
1981	35,000	120,700	1,400	4.9
1982	42,300	158,400	1,690	6.4
1983	49,500	202,800	2,030	8.2
1984	59,300	256,200	2,430	10.4

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MINICOMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	46,600	135,300	$ 930	$ 2.7
1975	48,600	181,400	1,155	3.8
1976	58,400	235,300	1,515	5.2
1977	82,000	311,200	2,055	7.0
1978	103,500	406,500	2,675	9.4
1979	122,000	517,000	3,430	12.6
1980	137,400	638,500	4,165	16.4
1981	164,600	783,800	5,265	21.2
1982	194,200	954,800	6,685	27.5
1983	226,200	1,153,600	8,260	35.1
1984	259,900	1,380,000	9,950	44.2
		UNITED STATES		
1974	33,900	96,100	$ 625	$ 1.9
1975	34,500	126,300	725	2.6
1976	42,000	162,300	970	3.4
1977	60,000	214,500	1,335	4.5
1978	72,200	276,800	1,715	6.0
1979	80,700	344,800	2,230	8.0
1980	89,300	419,600	2,655	10.3
1981	108,600	511,600	3,365	13.3
1982	129,300	621,100	4,275	17.2
1983	150,200	748,900	5,220	21.9
1984	171,500	894,000	6,250	27.5
		INTERNATIONAL		
1974	12,700	39,200	$ 305	$ .8
1975	14,100	55,100	430	1.2
1976	16,400	73,000	545	1.8
1977	22,000	96,700	720	2.5
1978	31,300	129,700	960	3.4
1979	41,300	172,200	1,200	4.6
1980	48,100	218,900	1,510	6.1
1981	56,000	272,200	1,900	7.9
1982	64,900	333,700	2,410	10.3
1983	76,000	404,700	3,040	13.2
1984	88,400	486,000	3,700	16.7

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DESKTOP COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	3,000	6,000	$ 40	0.1
1975	3,000	9,000	50	0.2
1976	12,000	21,000	150	0.3
1977	43,000	64,000	230	0.5
1978	172,000	236,000	756	1.3
1979	299,000	535,000	1,282	2.5
1980	444,000	979,000	1,929	4.5
1981	638,000	1,617,000	2,797	7.3
1982	892,000	2,509,000	3,959	11.2
1983	1,193,000	3,702,000	5,330	16.6
1984	1,519,000	5,221,000	6,815	23.4
		UNITED STATES		
1974	1,500	3,000	$ 20	$ *
1975	1,500	5,000	25	0.1
1976	7,000	12,000	80	0.2
1977	30,000	42,000	170	0.3
1978	129,000	171,000	495	0.8
1979	200,000	371,000	841	1.6
1980	285,000	656,000	1,240	2.9
1981	394,000	1,050,000	1,753	4.7
1982	530,000	1,580,000	2,400	7.0
1983	685,000	2,265,000	3,121	10.2
1984	849,000	3,114,000	3,881	14.1
		INTERNATIONAL		
1974	1,500	3,000	$ 20	$ *
1975	1,500	4,000	25	0.1
1976	5,000	9,000	70	0.1
1977	13,000	22,000	60	0.2
1978	43,000	65,000	261	0.5
1979	99,000	164,000	441	0.9
1980	159,000	323,000	686	1.6
1981	244,000	567,000	1,044	2.6
1982	362,000	929,000	1,559	4.2
1983	508,000	1,437,000	2,209	6.4
1984	670,000	2,107,000	2,934	9.3

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GENERAL-PURPOSE COMPUTER CENSUS

Counts in the General-Purpose Computer Census are based on the best information available to IDC -- but are estimates nevertheless. Computer makers, as a rule, do not directly supply this type of data. General-purpose computers -- as characterized by IBM's 370, 303X and competitors -- comprise the bulk of digital computers by value. They are primarily character or byte oriented and programmed in higher-level language.

Instead of being pegged to constantly shifting average values, size classes are based on currently marketed IBM products and other manufacturers' models that compete with them, e.g., a computer in Size Class 7 would compete with an IBM 3033 or 168. (Other classes can be checked under IBM's column.) Note that many mainframe manufacturers also offer smaller systems that are included in the Small Business Computer Census. An "X" in the last column means none on order from the original manufacturer. Monthly rental is based on system price including peripherals except for plug compatible vendors Amdahl, CDC-Omega, Magnuson and NAS, where only the CPU value is counted.

AS OF JANUARY 1, 1980

NAME OF MANUFACTURER	COMPUTER MODEL	SIZE CLASS	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Amdahl	470V/5	6	$ 65,000	9/77	35	30	65	X
	470V/6	7	95,000	6/75	125	47	172	X
	470V/7	7	102,000	9/78	47	32	79	70
	470V/8	7	117,000	9/79	10	5	15	80
	Total				217	114	331	150
Burroughs	2/3/500	3	6,600	11/61	250	195	445	X
	1710	2	2,700	8/72	850	470	1320	X
	1720	3	7,200	2/73	500	280	780	X
	1815/25/30	2	3,100	5/77	240	320	560	200
	1855/60/70/85	3	6,400	5/77	770	250	1,020	250
	1905	2	2,700	12/79	10	-	10	300
	1955/85	3	5,000	12/79	10	-	10	350
	2500	4	10,400	2/67	22	40	62	X
	2700	4	11,000	8/72	280	165	445	X
	2800	4	11,100	12/76	210	125	335	200
	2900	4	12,100	12/79	10	-	10	
	3500	4	19,000	5/67	210	225	435	X
	3700	4	26,000	11/72	285	260	545	X
	3800	4	17,100	4/77	160	75	235	130
	3900	4	18,600	12/79	2	-	2	
	45/4700	5	33,000	10/71	305	125	430	X
	4800	5	32,500	9/76	160	75	235	100
	5500	5	35,000	3/63	22	10	32	X
	5700	5	33,000	12/70	3	5	8	X
	65/6700	6	66,000	11/69	145	110	255	X
	6800	5	46,100	6/77	140	95	235	100
	6900	5	57,000	6/80	-	-	-	
	7700	7	130,000	8/73	49	24	73	X
	7800	7	124,000	11/78	4	2	6	25
	Total				4,637	2,851	7,488	1,655
Cambridge	1600	3	3,600	1/79	10	-	10	25
CDC	Omega 480-1	4	12,800	6/77	60	-	60	5
	Omega 480-2	5	13,700	8/78	50	-	50	25
	Omega 480-3	5	14,000	1/80	-	-	-	40
	Cyber 170-720	5	37,000	5/79	8	6	14	30
	Cyber 170-730	6	53,000	6/79	10	3	13	20
	Cyber 170-750	6	113,000	8/79	3	2	5	10
	Cyber 170-760	7	145,000	4/79	2	-	2	15
	Cyber 71	4	21,000	7/76	5	9	14	X
	Cyber 171	4	28,000	8/77	18	42	60	X
	Cyber 72	5	42,000	10/71	13	42	55	X
	Cyber 172	6	51,000	7/75	29	44	73	X
	Cyber 73	6	61,000	3/72	20	35	55	X
	Cyber 173	6	80,000	9/75	10	38	48	X
	Cyber 74	7	116,000	3/72	23	15	38	X
	Cyber 174	6	103,000	9/75	14	20	34	X
	Cyber 175	7	14,700	8/75	21	37	58	X
	Cyber 76	7	184,000	3/72	7	8	15	X
	Cyber 176	7	187,000	1/78	6	2	8	3
	G-20	4	19,300	4/61	1	-	1	X
	1604	6	41,000	1/60	5	-	5	X
	31/3150	4	9,700	12/64	43	18	61	X
	3170	5	22,500	12/70	15	17	32	X
	3200	4	14,700	5/64	25	16	41	X
	3300	5	34,500	9/65	77	42	119	X
	3400	5	23,500	11/64	3	1	4	X
	3500	5	31,000	1/69	29	10	39	X
	3600	6	49,000	6/63	13	10	23	X
	3800	6	60,000	12/65	12	1	13	X
	6200	6	42,500	11/70	-	3	3	X
	6400	6	63,000	5/66	39	26	65	X
	6500	6	86,000	12/67	15	12	27	X
	6600	7	116,000	8/64	38	21	59	X
	6700	7	140,000	7/70	3	-	3	X
	7600	7	191,000	1/69	20	7	27	X
	Star 100	7	280,000	12/74	4	-	4	X
	Cyber 203	7	250,000	11/80	-	-	-	2
	Total				641	487	1,128	150
Cray	1A	7	205,000	4/76	9	4	13	9
	1S	7	125,000	/81	-	-	-	1
DEC	2020	3	6,900	7/78	125	75	200	150
	2040	4	10,900	6/76	80	50	130	5
	2050	4	20,000	5/77	90	50	140	20
	2060	5	21,500	7/79	30	10	40	80
	PDP-6	4	10,000	10/64	3	-	3	X
	1040/50	4	17,300	10/67	130	85	215	X
	1060/70	5	21,500	6/72	115	105	220	X
	1080/90	6	31,000	6/75	130	90	220	X
	Total				703	465	1,168	255

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AS OF JANUARY 1, 1980

NAME OF MANUFACTURER	COMPUTER MODEL	SIZE CLASS	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Honeywell	DPS 8/20	4	10,500	6/80	-	-	-	100
	DPS 8/44	4	16,400	6/80	-	-	-	100
	DPS 8/52	5	42,500	6/80	-	-	-	70
	DPS 8/70	6	86,000	6/80	-	-	-	50
	Subtotal				-	-	-	320
	H-61/40	2	2,300	6/76	-	700	700	) 200
	H-61/58	2	2,500	6/74	105	480	585	)
	H-61/60	2	3,600	6/74	60	1,070	1,130	)
	H-Level 62	3	5,500	10/74	900	1,130	2,030	400
	H-64/300	4	8,300	4/79	15	-	15	) 50
	H-Level 64	4	12,000	10/74	370	720	1,090	)
	H-66/05/07	4	20,000	10/76	105	125	230	15
	H-66/10/17	5	31,500	6/75	80	96	176	5
	H-66/20/27	5	43,500	11/74	100	130	230	5
	H-66/40/60	6	84,000	10/74	97	100	197	5
	H-66/440/520	5	19,000	12/79	2	-	2	2
	H-66/DPS/BC	5	43,000	6/79	5	2	7	15
	H-66/DPS	6	79,000	7/78	55	75	130	50
	H-66/80	7	130,000	10/74	23	16	39	5
	H-68/80	7	112,000	10/74	20	3	23	X
	H-68/DPS	7	124,000	9/78	5	25	30	20
	Comshare/Xerox	5	14,300	6/79	5	-	5	10
	S-60 Subtotal				1,947	4,672	6,619	782
	G-50	2	1,900	8/70	135	1,070	1,205	X
	G-100	3	4,900	4/66	65	850	915	X
	G-200	4	9,700	4/61	90	18	108	X
	G-400	4	15,900	5/64	165	125	290	X
	G-600	6	77,000	4/65	27	16	43	X
	G-6023/25	5	34,000	11/73	22	19	41	X
	G-6030/40	5	43,000	6/71	44	97	141	X
	G-6050/60	6	74,000	7/71	89	55	144	X
	G-6070/80	6	111,000	7/71	46	32	78	X
	G-6180	7	108,000	2/74	5	-	5	X
	Gamma-10	2	2,500	7/64	-	370	370	X
	Gamma-30	4	10,000	2/62	-	35	35	X
	G-Subtotal				688	2,687	3,375	-
	H-105/115	3	6,400	3/70	160	195	355	X
	H-110/120/200	3	6,600	1/66	250	190	440	X
	H-125	4	8,500	12/67	12	85	97	X
	H-2020/30	3	4,400	1/73	400	130	530	X
	H-1015/2015	4	18,700	2/71	42	37	79	X
	H-1200	4	14,600	2/66	160	53	213	X
	H-2040	4	13,800	4/72	180	93	273	X
	H-2050/2060	4	21,500	4/72	125	110	235	X
	H-2200	4	20,000	1/66	68	24	92	X
	H-2070	5	37,000	5/72	26	2	28	X
	H-3200	5	28,500	2/70	65	36	101	X
	H-4200	5	44,500	9/68	6	3	9	X
	H-8200	6	69,000	2/69	14	9	23	X
	H-4/1400	4	13,000	12/61	8	9	17	X
	H-8/1800	5	35,000	12/60	6	6	12	X
	H-Subtotal				1,522	982	2,504	-
	Total				4,157	8,341	12,498	1,102
IBM	System/38-3	2	3,600	7/80	-	-	-	6,000
	System/38-5	3	9,700	7/80	-	-	-	3,500
	System/38 Subtotal				-	-	-	9,500
	System/3-4	2	1,500	6/76	340	125	465	X
	System/3-6	2	2,000	12/70	600	450	1,050	X
	System/3-8	2	2,400	6/75	3,200	2,930	6,130	X
	System/3-10	2	3,100	1/70	5,500	3,600	9,100	X
	System/3-12	3	4,400	3/76	3,600	2,800	6,400	X
	System/3-15	3	7,900	3/74	3,450	2,120	5,570	250
	System/3 Subtotal				16,690	12,025	28,715	250
	4331	3	8,000	4/79	350	400	750	4,000
	4341	4	19,400	10/79	75	30	105	2,500
	4300 Subtotal				425	430	855	6,500
	3031	6	66,000	3/78	700	880	1,580	750
	3032	6	124,000	3/78	260	440	700	50
	3033	7	201,000	3/78	600	430	1,030	1,050
	370/115	3	10,500	4/74	860	2,020	2,880	X
	370/125	4	14,500	6/73	800	1,520	2,320	X
	370/135	4	23,000	5/72	930	1,400	2,330	X
	370/138	4	23,500	11/76	1,930	2,740	4,670	X
	370/145	5	42,500	7/71	920	1,120	2,040	X
	370/148	5	38,500	3/77	1,540	1,850	3,390	X
	370/155	6	77,000	2/71	365	220	585	X
	370/158	6	118,000	5/73	1,550	1,340	2,890	X
	370/165	7	145,000	6/71	95	32	127	X
	370/168	7	213,000	7/73	610	310	920	X
	370/195	7	296,000	3/71	10	4	14	X
	370 Subtotal				11,170	14,306	25,476	1,850
	360/20	3	2,900	12/65	670	850	1,520	X
	360/22	3	3,700	7/71	50	70	120	X
	360/25	3	8,300	10/68	55	260	315	X
	360/30	4	11,200	6/65	1,220	550	1,770	X
	360/44	4	18,700	7/66	40	29	69	X
	360/40	4	19,000	6/65	890	560	1,450	X
	360/50	5	33,000	8/65	405	210	615	X
	360/65	6	69,000	11/65	360	120	480	X
	360/67	7	140,000	6/66	11	6	17	X
	370/75	7	121,000	1/66	21	8	29	X
	360/85	7	183,000	10/69	1	-	1	X
	360/9X	7	197,000	11/67	9	5	14	X
	360 Subtotal				3,732	2,668	6,400	-
	1130	2	2,600	2/66	1,000	900	1,900	X
	1401	3	3,700	9/60	430	300	730	X
	1401-G	2	2,400	5/64	7	5	12	X
	1401-H	2	1,750	6/67	3	-	3	X
	1410	4	16,700	11/61	12	10	22	X
	1440	3	4,700	4/63	43	55	98	X
	1460	4	9,600	10/63	11	5	16	X
	1620	3	2,700	9/60	65	60	125	X
	7010	5	25,000	10/63	6	3	9	X
	7030	7	160,000	5/61	1	-	1	X
	7040/44	5	30,000	6/63	6	6	12	X
	7070/74	5	27,000	3/60	50	6	56	X
	7080	6	58,000	8/61	15	-	15	X
	7090/94	6	70,000	8/60	12	8	20	X
	Subtotal				1,661	1,358	3,019	-
	Total				33,678	30,787	64,465	18,100

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AS OF JANUARY 1, 1980

NAME OF MANUFACTURER	COMPUTER MODEL	SIZE CLASS	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Magnuson	M80/3	4	6,000	1/79	10	1	11	5
	M80/4	5	8,300	12/78	45	5	50	20
	M80/32	4	6,900	5/80	-	-	-	60
	M80/42	4	10,600	9/80	-	-	-	10
	M80/43	5	12,300	9/80	-	-	-	5
	Total				55	6	61	100
National Advanced Systems	AS/3	4	16,600	11/78	30	32	62	3
	AS/4	5	25,000	6/77	30	16	46	X
	AS/5	6	40,000	3/77	130	72	202	10
	AS/7020/30	5	21,500	1/79	-	11	11	X
	AS/7031	6	35,500	12/78	35	27	62	5
	AS/6	6	63,000	5/78	40	34	74	2
	AS/3000	5	12,700	1/80	-	-	-	90
	AS/5000	6	20,000	2/80	-	-	-	50
	AS/7000	6	44,500	4/80	-	-	-	40
	Total				265	192	457	200
NCR	8270	2	2,000	11/79	100	25	125	350
	8350	2	3,400	7/77	150	15	165	50
	8370	3	6,300	7/78	15	-	15	10
	8410	2	3,300	2/79	150	-	150	175
	8430	3	5,500	6/78	44	60	104	75
	8450	3	7,900	11/77	340	170	510	200
	8455	3	6,900	4/79	60	-	60	125
	8550	3	13,300	4/76	340	270	610	X
	8555	3	10,700	4/79	50	-	50	150
	8560	4	15,700	11/77	70	25	95	X
	8565	4	14,300	4/79	15	-	15	75
	8570	4	20,000	5/76	110	105	215	X
	8575	4	18,600	4/79	15	-	15	80
	8580	5	38,000	12/78	5	10	15	X
	8585	5	37,000	8/79	10	-	10	35
	Subtotal				1,474	680	2,154	1,325
	Century 50	2	1,700	2/71	300	46	346	X
	Century 75	2	2,300	7/76	75	-	75	X
	Century 100	3	3,300	9/68	245	520	765	X
	Century 101	3	4,200	10/72	670	620	1,290	X
	Century 151	3	5,600	2/75	250	130	380	X
	Century 200	4	7,600	9/69	150	280	430	X
	Century 201	4	12,000	8/74	180	135	315	X
	Century 251	4	21,000	11/73	44	62	106	X
	Century 300	5	27,500	2/72	85	83	168	X
	315	3	3,400	5/62	36	80	116	X
	315-RMC	4	10,400	9/65	8	12	20	X
	Subtotal				2,043	1,968	4,011	-
	Total				3,517	2,648	6,165	1,325
Singer	System 10	2	2,700	10/70	1,250	-	1,250	X
Sperry Univac	III	4	27,000	8/62	75	23	98	X
	SS 80/90	3	8,500	8/58	-	2	2	X
	418 I, II	4	10,700	6/63	30	49	79	X
	418 III	4	40,500	6/69	35	83	118	X
	491/492	5	28,000	12/61	9	8	17	X
	494	6	76,000	2/66	55	58	113	X
	1004	2	1,100	2/63	200	130	330	X
	1005	2	2,000	4/66	155	60	215	X
	1050	3	9,000	9/63	115	25	140	X
	1106	6	45,500	12/69	55	170	225	X
	1107	6	60,000	10/62	4	8	12	X
	1108	7	92,000	9/65	140	80	220	X
	1110	7	149,000	6/72	44	55	99	X
	9200	2	2,300	6/67	380	400	780	X
	9300	3	5,000	9/67	340	310	650	X
	9400/80	4	12,600	5/69	165	310	475	X
	90/25	3	4,500	8/77	130	100	230	60
	90/30	3	9,300	2/75	860	1,200	2,060	175
	90/40	4	16,300	6/78	75	105	180	150
	90/60	4	27,000	1/74	125	150	275	40
	90/70/9700	5	32,000	8/72	16	42	58	5
	90/80	5	73,000	12/76	70	20	90	50
	1100/10	5	46,500	4/76	95	165	260	10
	1100/20	5	63,000	4/75	20	40	60	X
	1100/40	6	106,000	7/75	40	45	85	X
	1100/60		48,500	1/80	-	-	-	125
	1100/81/82	6	128,000	3/77	85	100	185	75
	1100/83	7	205,000	7/78	1	1	2	5
	1100/84	7	250,000	11/78	1	1	2	2
	Subtotal				3,320	3,740	7,060	697
	301	4	6,700	10/60	20	2	22	X
	501	5	15,800	6/59	1	-	1	X
	3301	5	23,500	6/64	35	-	35	X
	Spectra 70/15	3	4,600	9/65	3	-	3	X
	Spectra 70/25	3	7,800	9/65	-	7	7	X
	Spectra 70/35	4	14,400	1/67	40	2	42	X
	Spectra 70/45	5	27,000	11/65	100	2	102	X
	Spectra 70/46	5	44,500	11/68	19	-	19	X
	Spectra 70/55	5	41,500	11/68	2	-	2	X
	Spectra 70/60	6	51,000	9/70	17	-	17	X
	Spectra 70/61	6	56,000	3/71	4	-	4	X
	Spectra 1600	3	4,300	1/69	25	-	25	X
	Spectra 70/2	4	14,100	7/71	18	-	18	X
	Spectra 70/3	4	23,500	10/71	9	-	9	X
	Spectra 70/6	6	38,000	10/71	25	-	25	X
	Spectra 70/7	6	48,500	10/71	16	-	16	X
	Subtotal				334	13	347	-
	Total				3,654	3,753	7,407	697
Xerox	Sigma 5	4	14,600	8/67	115	20	135	X
	Sigma 6	4	25,500	11/70	32	13	45	X
	Sigma 7	5	29,000	12/66	57	8	65	X
	Sigma 8	4	23,000	9/71	3	4	7	X
	Sigma 9	6	59,000	11/71	65	31	96	X
	530	3	4,300	8/73	101	28	129	X
	550/560	4	15,400	11/74	28	5	33	X
	940	5	26,000	4/66	34	3	37	X
	9300	3	8,500	11/64	15	4	19	X
	Total				450	116	566	-
TOTAL					53,243	49,764	103,007	23,769

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SMALL BUSINESS COMPUTER CENSUS

The categorization of certain computers as "small business computers" is based on marketplace definitions as perceived by IDC. SBCs are those small general-purpose computers marketed to smaller businesses, first-time users, and increasingly to small units of large organizations. They include offerings from the major mainframers (such as IBM's System/32 and 34); products such as DEC's Datasystem/300 from the minimakers but aimed at commercial first-time users; equipment from firms (such as Qantel) that manufacture only SBCs; and products from companies that market systems assembled from others' minicomputers (i.e., systems houses).

AS OF JANUARY 1, 1980

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ORDERS FOR 1980 INSTALLATION
Advanced Information Design*	System 3000	Interdata X/16		24	39	3/75	41	0	41	X
Anderson Jacobson	1400	AJ 1400	a	16	22	1/70	260	15	275	X
	1520 Series	AJ 1500		19	21	7/77	200	25	225	12
	1560 Series	AJ 1500		30	35	7/77	60	3	63	12
	Total						520	43	563	24
Applied Computer Systems	Smart Alec	8080 A		12	13	1/77	47	17	64	68
Applied Data Communications	Event	Event 2000		13	20	2/77	150	12	162	100
	Clinic 2	Event 2000		19	23	6/79	20	0	20	60
	Event 3000	8080 A		22	22	12/79	1	0	1	100
	League Master	8080 A		23	23	/80	0	0	0	50
	Total						171	12	183	310
Applied Data Processing, Inc.	Resource 50	Nova 3/4		31	52	9/79	1	0	1	3
	Resource 100	Nova 3/12		41	72	6/79	16	0	16	3
	Total						17	0	17	6
Applied Digital Data Systems, Inc.	ADDS/Vantage	8080		11	14	7/76	550	400	950	NA
Astrocom	Series 760	Z80		16	20	6/79	10	0	10	NA
Ball Computer Products*	DASL	Nova 2/10		38	40	6/75	3	0	3	X
Basic Four Corporation	200	BFC 1340		25	29	2/78	110	293	403	430
	350	BFC 1300, Microdata	b	34	34	9/71	500	576	1,076	X
	400	BFC 1300, Microdata	b	37	45	9/71	1,712	1,739	3,451	X
	410	BFC 1300		33	40	10/78	507	969	1,476	1,250
	500	BFC 1300, Microdata	b	39	50	7/72	100	82	182	X
	600	BFC 1300, Microdata	b	51	65	3/75	300	308	608	X
	610	BFC 1320		51	65	1/78	759	549	1,308	1,000
	700	BFC 1320		115	130	/77	109	99	208	X
	730	BFC 1350		95	25	6/78	319	279	598	530
	Total						4,416	4,894	9,310	3,210
Basic Time	B-100	Digidyne		16	16	7/79	25	10	35	25
	B-200	Digidyne		20	20	11/79	0	0	0	10
	Total						0	10	35	35
Binary Data Systems	Award	Eclipse S/130		150	250	/75	12	0	12	12
	BBPS	Eclipse S/130		125	150	/78	5	0	5	6
	GBS	Eclipse S/130, S/140, Nova 4		75	125	/75	40	0	40	20
	Total						57	0	57	38
BRD	Dolphin	6800		18	20	6/77	400	30	430	9
	Porpoise	6800		10	13	1/78	160	5	165	9
	Total						560	35	595	18
Briareus	Briareus	EDS Point 4		23	30	1/76	80	0	80	55
Broadcast Management Concept	Mesa Two	Nova 4	c	60	85	4/78	30	0	30	6
BTI Computer Systems	4000/15	BTI 4020		36	40	1/76	341	8	349	X
	4000/25	BTI 4020		56	65	1/76	251	12	263	X
	5000	BTI 5030		39	49	9/78	1,420	40	1,460	900
	5000/ES	BTI 5000		30	36	7/79	60	0	60	150
	Total						2,072	60	2,132	1,050
Burroughs	B 80	B 80		17	34	11/76	3,000	4,300	7,300	3,000
	B 90	B 90		18	33	12/79				
	B 700	B 700		26	68	3/33	2,400	1,800	4,200	X
	B 800	B 800		35	55	5/77	2,100	1,500	3,600	2,000
	Total						7,500	7,600	15,100	5,000
Business Controls Corporation	System 80	PDP-8/a		25	40	6/71	60	0	60	X
	Business Control System	PDP-11/23/34/ 44/70, VAX		40	80	6/75	85	10	95	40
	Total						145	10	155	40
Business Systems Products*	Adviser	C.A. Syfa		42	50	7/76	111	0	111	X
Cado	Cado System 20	Intel 8080		12	16	1/78	500	150	650	
	Cado System 40	Intel 8080		18	20	4/76	250	60	310	
	Cado System 20/4	Intel 8085		17	30	6/78	1,100	200	1,300	2,500
	Cado System 40/4	Intel 8085		20	37	6/78	50	300	350	
	Cado System 20/2	Intel 8085		15	20	7/79	50	50	100	
	Total						1,950	760	2,710	2,500
Cascade Data, Inc.	80/20,30,40	Concept		28	43	1/70	50	0	50	X
	Concept II	Concept		27	35	6/75				X
	Concept III	Concept		32	39	1/78	312	15	327	NA
	Concept IV	Concept		17	19	4/78				
	Total						362	15	377	
Century Computer Corp.	C-400	C-200,400		34	45	3/75	204	39	243	NA
	C-700	C-200,400		38	55	6/76	55	11	66	NA
	C-900	C-400		27	40	4/77	127	27	154	NA
	C-1000	C-400		40	50	6/77	22	0	22	NA
	Opus III	C-200		15	22	2/71	560	40	600	X
	Total						968	117	1,085	
Cincinnati Milacron	George 40	CIP/2200 B		16	20	2/77				NA
	George 60	CIP/2200 B		26	34	/76				NA
	George 70	CIP/2200 B		26	35	/76	670	150	820	NA
	George 80	CIP/4400		43	60	12/76				X
	Other	CIP/2200 B		23	34	/74				NA
Clary Data Systems*	404	Clary		6	30	1/70	100	32	132	X
Compal	9000	602,Nova 4C,4S,4X		26	30	1/80	0	0	0	50

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AS OF JANUARY 1, 1980

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ORDERS FOR 1980 INSTALLATION
Complete Computer Systems	10,11,12	Nova 3/12		31	43	3/74	17	0	17	14
	14,16,18	Nova 3/12		45	58	10/76	29	0	29	
	20,22,24	Nova 3/12		58	74	9/77	8	0	8	
	Total						54	0	54	
Compucorp*	402	Compucorp 3000		13	15	1/76	15	455	470	X
	450	Compucorp 3000		20	22	4/76	40	115	155	X
	Total						55	570	625	
Computer Hardware, Inc.	2120	CHI		15	50	5/75	10	0	10	X
	2130 C	CHI C		32	75	7/74	350	4	354	10
	2130 D	CHI D		44	120	1/78	10	1	11	3
	3230	CHI		15	50	6/76	60	0	60	60
	4210	CHI		13	13	9/77	4	0	4	1
	4250	CHI		37	45	6/78	7	0	7	1
	Total						441	5	446	75
Computer Interactions, Inc.	Compo II-8	PDP-8/e,f,m		40	55	11/72	235	0	235	35
	Compo II-11	PDP-11		40	55	6/75	210	0	210	90
	Word Pro II	PDP-8/a, Nova, H-P		13	19	2/77	320	0	320	190
	Total						765	0	765	315
Data General	CS/20	MicroNova		11	20	7/78	100	20	120	NA
	CS/30	MicroNova		21	25	8/79	200	50	250	NA
	CS/40	Nova 3/12		33	40	10/77	1,000	250	1,250	NA
	CS/50	MicroNova 4S,4X		32	68	/80	0	0	0	NA
	CS/60	Eclipse		40	75	7/78	1,100	0	1,100	NA
	Design Data EC300	Eclipse C/300	d	60	150	3/76	50	10	60	X
	Design Data N312	Nova 3/12	d	31	75	8/75	120	10	130	X
	Synergist 1500	MicroNova	e	8	24	/76	30	0	30	35
	Synergist 1550	MicroNova	e	14	21	7/78	45	0	45	35
	Synergist 2500	Nova 3/12	e	27	40	/76	215	0	215	115
	Synergist 3700	Nova 3/D	e	40	60	/76	30	0	30	---
	Total						2,890	340	3,230	
Decision Data Computer Corporation*	System/4	System/4		23	37	8/76	15	0	15	X
Diablo Systems, Inc.	3200	8080	f	19	23	1/77	1,000	1,500	2,500	NA
Digital Equipment Corporation	Datasystem 300	PDP-8, PDP-11		14	30	/72	6,300	4,000	10,300	3,000
	Datasystem 500	PDP-11		58	115	/72	1,400	1,500	2,900	1,200
	DECstation 78	PDP-8		8	11	9/78	800	500	1,300	1,000
	DECstation 88	PDP-8A		12	15	3/78				
	Total						8,500	6,000	14,500	5,200
Digital Systems Corporation	Galaxy/5	Galaxy/5		90	120	1/76	32	0	32	6
	Galaxy/3	Galaxy/3		50	65	1/80	3	0	3	4
	Total						35	0	35	10
Dimis, Inc.	Total 100	Modcomp II, Classic		110	155	1/79	27	0	27	NA
Display Data Corporation	Insight	Microdata 1600/30		38	59	1/74	800	10	810	300
	ELS System	Microdata 1600/30		27	33	5/78	250	0	250	100
	Total						1,050	10	1,060	400
DTC	TaskMaster	8080		17	19	9/78	25	90	115	100
Financial Computer Corporation*	System III/6	System III		19	25	9/77	28	0	28	X
	System III/8	System III		23	32	9/77	22	0	22	X
	System III/10	System III		30	45	1/75	440	55	495	X
	Total						490	55	545	
Gemini Information Systems	Gispac/1	Series I		54	66	4/78	17	0	17	12
	Gispac/16	Interdata X/16		54	65	4/76	39	0	39	16
	Gispac/32	Interdata X/32		97	110	4/76	22	0	22	14
	Total						78	0	78	42
General Automation, Inc.	DM-130/2	SPC-16/45		28	28	12/74	150	350	500	X
	DM-130	SPC-16/45		30	38	12/74	80	180	260	X
	DM-140	SPC-16/65		48	80	1/75	7	18	25	X
	440-DS	GA-16/440		38	70	1/76	35	65	100	X
	460-DS	GA-16/460		35	80	11/78	10	30	40	NA
	Total						282	643	925	
General Information Systems	GIS-350 ABLE	PDP-11/34		36	40	1/76	20	0	20	6
General Robotics Corporation	Gemini (FO/X3)	LSI-11		10	21	7/76	180	195	375	150
	Tristar (FO/X3)	LSI-11		11	22	7/76	60	65	125	50
	Pegasus (CO/X3)	LSI-11		18	39	9/77	100	100	200	100
	Total						340	360	700	300
GRI Computer Corporation	System 99	GRI 99/50		30	35	11/74	196	88	284	NA
	System 99/E	GRI 99/52		43	50	11/77	35	15	50	NA
	Total						231	103	334	
Hewlett-Packard	HP 250	HP 250		24	42	9/78	500	600	1,100	1,500
	HP 300	HP 300		30	55	9/78	200	300	500	500
	Total						700	900	1,600	2,000
IBM	System/32	IBM S/32	g	27	42	3/75	9,800	5,400	15,200	X
	System/34	IBM S/34		35	50	12/77	20,500	9,500	30,000	19,000
	Total						30,300	14,900	45,200	19,000
Infotecs	IMP	IM 6100		10	15	9/77	505	26	531	1,050
International Computing Corporation*	System 95/99	Nova 2/10		24	35	10/72	9	0	9	X
Jacquard	J100	NS IMP-16		22	44	8/75	800	700	1,500	NA
Keydata	Unity Series	Nova 3/4,3/12, 3/D		48	80	4/79	5	28	33	30
Lockheed Electronics Company, Inc.	System III	Lockheed SUE		30	50	1/73	465	130	595	X
Logical Machine Corporation	ADAM I	ADAM		30	35	4/75	352	404	756	291
	TINA	TINA		18	20	12/78	184	532	716	420
	ADAM II	ADAM		25	30	10/79	5	33	38	240
	Total						541	969	1,510	951
Martin Wolfe, Inc.*	Mesa Two 7000	DCC-116		54	81	12/71	140	0	140	X
	Mesa Two 4000	DCC-116		62	93	2/76	3	0	3	X
	Total						143	0	143	
Microdata	Reality	Microdata 1600		32	60	12/73	2,600	500	3,100	NA
	Reality 2000	Microdata 1600		32	36	6/79	30	0	30	NA
	Reality 4000	Microdata 1600		38	50	6/79	120	0	120	NA
	Reality 6000	Microdata 1600		62	76	6/79	300	12	312	NA
	Reality 8000	Microdata 1600		85	95	2/80	2	0	2	NA
	Total						3,052	512	3,564	
Microstar, Inc.*	Microstar I	Zilog Z80		13	17	12/78	5	0	5	X
	Microstar II	Zilog Z80		14	19	12/78				X
Mini-Computer Systems, Inc.	Micos 100	Nova 3/4		34	40	8/77	40	60	100	20
	Micos 200	Nova 3/12		40	60	/73	855	375	1,230	300
	Micos 300	Dual Nova 3/12		100	140	1/79	1	0	1	25
	Micos 75	Nova 3/4		26	26	9/79	12	10	22	60
	Total						908	445	1,353	405

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NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ORDERS FOR 1980 INSTALLATION
Minutemen Computer Corporation	1774	Nova 3/4		30	40	11/71	56	0	56	
	1775	Nova 3/12		32	44	3/72	33	0	33	
	1776	Nova 3/12		35	59	3/72	31	0	31	40
	1776/A	Nova 3/12		35	65	5/77	30	0	30	
	Total						150	0	150	40
Moore Business Systems	MBS 20/50	DS 990/1		20	25	1/80	0	0	0	250
Mylee Digital Sciences, Inc.	3000 Series	Mylee 3G		29	60	5/76	150	0	150	5
NCR Corporation	8130	NCR		19	23	3/78	1,000	1,400	2,400	1,800
	8150	NCR		27	34	12/77				
	8200	NCR		33	63	9/75	5,200	4,200	9,400	4,000
	8230	NCR		31	45	6/77				
	8250	NCR		34	64	12/76				
	Total						6,200	5,600	11,800	5,800
Norfield Datasystems, Inc.*	Nova-System	Nova		35	50	6/73	20	0	20	X
Northrop Data Systems	BDS 500	Microdata 1600		30	48	3/77	40	0	40	
	BDS 1000	Microdata 1600		35	55	6/72	75	0	75	211
	BDS 2000	Microdata 1600		43	73	10/73	88	0	88	
	BDS 4000	Microdata 1600		51	85	10/79	8	0	8	
	Total						211	0	211	211
Pick & Associates	Unit 1	Multi 6		65	77	11/73	156	18	174	60
	Unit 2	Multi 6		88	97	10/77	25	4	29	23
	Total						181	22	203	83
Prodigy Systems, Inc.	Prodigy 1	Z80-A		13	14	5/79	40	20	60	400
	Prodigy 2	Z80-A		14	16	6/80	0	0	0	100
	Total						40	20	60	500
Programmed Control Corporation	Prophet 21/1	TI 960-8		42	75	/72	40	0	40	3
	Prophet 21/2	TI 990/10		57	100	1/78	30	1	31	15
	Total						70	1	71	18
Q1 Corporation	Q1/LMC	8080		21	23	2/74	550	0	550	8
	Q1/LITE	8800		21	26	2/77	460	350	810	300
	Q1/MICROLITE	8800		8	14	1/79	120	100	220	100
	Total						1,130	450	1,580	408
Qantel	210	Q29		12	17	11/77	200	500	700	300
	800/900	Q7		28	29	5/75	85	62	147	X
	950	Q7		28	33	11/75	600	240	840	150
	960	Q7.5		30	35	11/76	220	70	290	150
	970	Q29B		36	40	1/79	50	180	230	150
	1200	Q7		42	59	11/75	200	20	220	X
	1300	Q7.5		42	59	11/75	40	15	55	X
	1400,-2	Q7.5		44	70	5/77	360	170	530	0
	1450,-2	Q29B		45	80	1/79	80	40	120	100
	Total						1,835	1,297	3,132	850
Quodata Corporation (Educomp)	E-250,500	PDP-8		15	30	/72				
	E-660,760, 820,960	PDP-11		44	100	/75	250	40	290	11
	QDP/78	PDP-8		10	10	/77				
	ECS/7800	PDP-8		10	11	/77				
Randal Data Systems*	R-100 Series	Randal		14	17	10/75	257	13	270	X
	R-200 Series	Randal		24	30	10/76	382	0	382	X
	R-300 Series	Nova 2/10		34	45	6/74	27	0	27	X
	R-400 Series	Nova 2/10		36	45	6/74				X
	R-500 Series	Randal		42	47	10/77	45	0	45	X
	Total						711	13	724	
Retail Sciences, Inc.	Clerk 700	PE 5/16		19	19	10/78	18	5	23	5
	Clerk 800	PE 5/16		25	25	4/79	25	15	40	60
	Clerk 400	Z80		19	19	/80	0	0	0	NA
	Clerk 500	Z80		21	21	/80	0	0	0	NA
	Total						43	20	63	65
Sentinel Computer Corp.	Sentinel	8086		21	38	7/79	33	5	38	450
A.O. Smith *	Mesa Two	Nova 3		58	58	5/77	10	0	10	X
Space Byte Computer	DBM/1	8085		6	13	7/78	55	10	65	X
	DBM/2	Z80		13	15	6/79	10	0	10	73
	Total						65	10	75	73
Span Management Systems*	TSS 2	IBM Series/1		31	31	/77	10	3	13	X
Sperry Univac	BC-7	Univac		22	45	4/77	1,075	460	1,535	1,000
STC Systems, Inc.	Ultimacc 2000	Nova 3/12		34	80	9/72	108	2	110	5
	Ultimacc 3010	Nova 3/D		55	112	1/75	108	2	110	15
	Ultimacc 3080	Nova 3/D		84	143	11/75	25	0	25	20
	Total						241	4	245	40
Tri-Star, Inc.*	TTK-10	Nova 3/12		45	55	2/76	12	0	12	X
	TEK-80	Nova 3/12		52	67	4/76	4	0	4	X
	Total						16	0	16	
Vanguard Computer Systems, Inc.	V 400	Raytheon RDS 500		45	52	6/77	2	0	2	NA
	V 500	Raytheon RDS 500		65	85	3/76	5	2	7	NA
	Total						7	2	9	
Vista Computer, Inc.	VSM	Nova 4		29	29	/80	0	0	0	NA
Wang	2200	2200		10	19	4/73	12,730	8,390	21,120	1,645
	2200 VP	2200 VP		15	21	9/76	2,090	1,620	3,710	1,557
	2200 MVP	2200 MVP		18	36	1/78	1,850	1,310	3,160	2,652
	VS	2200 VS		47	97	10/77	620	380	1,000	771
	Total						17,290	11,700	28,990	6,625
Warrex Computer Corp.	Centurion I-A	CC-205		18	19	/77	60	0	60	X
	Centurion II-A	CC-205		27	30	/75	95	0	95	X
	Centurion III	CC-205		36	36	/74	555	0	555	43
	Centurion V	CC-205		43	43	/75	119	0	119	0
	Centurion Series 100	CC-205		14	15	/79	24	0	24	10
	Centurion Series 200	CC-205		25	28	/79	16	0	16	25
	Centurion Series 6000	CPU 6		18	35	1/80	0	0	0	63
	Total						869	0	869	141
Wintex Computer Corp.	200 NS	Wintex		12	18	1/75	95	1	96	X
	MT 200	Wintex		10	20	10/79	12	0	12	100
	Total						107	1	108	100
Zilog	MCZ 1/70	Z80		18	18	1/80	0	0	0	NA
TOTAL							104,850	62,089	166,939	

Notes:

a) Include installations of Eldorado 140.
b) Used Microdata processors until 11/76.
c) Corporate name changed from Automated Business Concepts, March 1, 1980.
d) Design data was acquired by Data General in February 1977.
e) Digital Computer Controls was acquired by Data General in early 1977.
f) Marketed in the U.S. by Shasta General Systems.
g) U.S. installation figures account for retirements.
*) Not currently active in manufacturing or marketing small business computers.
NA) Data is not available.
X) Model not in new production.

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MINICOMPUTER CENSUS

The categorization of certain computers as "minicomputers" is based on marketplace definitions as perceived by IDC. Minis are general-purpose in design but sold as tools, not just solutions; are available from the makers as complete systems, not just boards; are available to OEMs and usually discounted in volume buys; and are part of a family that has at least one product in the $2,000-$25,000 price range and comes with at least 4K RAM. Size classes are: (S) Supermini; (T) Traditional Mini; (M) Micromini. The heading on the minicomputer census has been changed this year from "Number Installed" to "Cumulative Number Shipped," reflecting the fact no attempt has been made to account for retirements.

AS OF JANUARY 1,1980

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	SIZE	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	CUMULATIVE NUMBER SHIPPED IN U.S.	CUMULATIVE NUMBER SHIPPED OUTSIDE U.S.	CUMULATIVE NUMBER SHIPPED TOTAL	ORDERS FOR 1980 INSTALLATION
Artonix*	PC-12/7	12	T	20	45	9/71	135	40	175	X
Bytronix	Series 500	16	T	3	4	/80	0	0	0	600
	Series 1000	16	T	5	5	12/77	60	250	310	200
	Series 2000	16	T	8	8	12/78	30	50	80	200
	Series 3000	16	T	7	8	12/78	20	170	190	150
	Total						110	470	580	1,150
Century Computer Corp.	C-200	8	T	5	7	2/71	150	0	150	X
Cincinnati Milacron	CIP/2000 Series	8	T	4	17	7/69	4,650	800	5,450	NA
	CIP/4000 Series	16	T	4	17	12/76				X
Compiler Systems, Inc.*	CSI-16	16	T	11	20	11/70	80	10	90	X
	CSI-24	24	T	15	30	12/70	35	5	40	X
	Total						115	15	130	
Computer Automation, Inc.	108/208/808	8	T	5	11	4/68	280	30	310	X
	116	16	T	8	16	8/70	200	50	250	X
	216	16	T	8	20	7/69	350	45	395	X
	816	16	T	10	15	12/68	40	5	45	X
	Alpha-8, Naked Mini-8	8	T	2	3	5/72	5,002	1,340	6,342	X
	Alpha-16, Naked Mini-16	16	T	3	8	10/71				
	LSI 2/10,2/20,2/60	16	T,T,S	2	5	12/73	18,356	1,942	20,298	NA
	LSI 3/05	16	M	1	2	2/76	1,974	536	2,510	NA
	LSI 4/10	16	M	1	2	6/77	1,422	328	1,750	NA
	LSI 4/30	16	T	2	4	6/77	698	186	884	NA
	LSI 4/90	16	S	4	9	6/77	421	84	505	NA
	Scout Naked Mini 4/04	16	M	0.6	1.0	12/79	NA	NA	NA	250
	Total						28,743	4,546	33,289	250
Computer Talk, Inc.	CT-400	16	S	25	30	9/75	7	0	7	NA
	CT-407	16	S	32	37	12/77	1	0	1	4
	CT-427	8	M	3	6	1/79	0	0	0	0
	Total						8	0	8	4
Control Data Corporation	1700	16+2	S	37	160	3/66				X
	1700-SC	16+2	S	20	60	9/70				X
	System 17	16+2	T	14	39	2/74				
	Cyber 18-10	16+2	T	14	40	/76	1,800	1,215	3,015	NA
	Cyber 18-20	16+2	T	16	75	/76				
	Cyber 18-30	16+2	S	110	116	9/76				
	Cyber 18-5	16+2	T	14	35	/77				
	Elbit-100	12	T	6	8	6/77	5	445	450	X
	Total						1,805	1,660	3,465	
Data General Corporation	MP 100,200	16	M	1	3	/79	400	100	500	650
	MicroNova	16	M	2	4	11/76	3,200	1,250	4,450	1,750
	Nova	16	T	6	12	2/69	750	400	1,150	X
	Nova 2 Series	16	T	3	8	10/73	5,630	1,970	7,600	115
	Nova 3/4	16	T	4	4	1/76	3,800	1,100	4,900	2,185
	Nova 3/12	16	T	5	18	1/76	11,700	5,150	16,850	6,560
	Nova 3/D	16	T	12	36	10/76	1,800	1,350	3,150	1,610
	Nova 4/C	16	T	3	5	/79				
	Nova 4/S	16	T	6	16	/79	700	900	1,600	2,100
	Nova 4/X	16	T	10	33	/79				
	Nova 800/820	16	T	7	34	3/71	2,180	720	2,900	X
	Nova 830/840	16	S	16	43	7/73	660	360	1,020	X
	Nova 1200 Series	16	T	3	11	12/70	8,400	3,450	11,850	X
	SuperNova, SC	16	T	9	27	4/70	300	150	450	X
	Eclipse S/100, 130, 140	16	S	11	30	2/75	3,320	1,150	4,470	1,800
	Eclipse AP/130	16	S	30	50	9/78				
	Eclipse S/200, 230	16	S	15	52	2/75	2,630	900	3,530	575
	Eclipse S/250	16	S	35	100	11/78	60	20	80	40
	Eclipse C/150	16	S	55	102	12/78	110	90	200	250
	Eclipse C/300,330	16	S	24	120	2/75	1,200	300	1,500	350
	Eclipse C/350	16	S	130	180	11/78	360	50	410	490
	Eclipse M/600	16	S	164	210	5/78	270	40	310	290
	Eclipse MV/8000	32	S	153		10/80	0	0	0	NA
	Subtotal						47,470	19,450	66,920	
	DCC-112	12	T	3	12	8/70	700	400	1,100	X
	DCC-116	16	T	5	10	11/71	7,450	1,350	8,800	X
	DCC-416/616	16	T/S	3	7	9/75	125	15	140	X
	DCC-Model 5	16+2	T	3	6	2/76	80	10	90	X
	Subtotal						8,355	1,775	10,130	
	Total						55,825	21,225	77,050	
Datamate Computer Systems*	DM-16	16	T	17	26	11/69	12	0	12	X
	DM-70	16	T	9	15	12/70	25	0	25	X
	ECP-18	18	T	14	16	11/66	21	0	21	X
	Total						58	0	58	
Datum, Inc.*	Enhancer E1/16	16	T	8	15	3/76	15	3	18	X
Digiac Corporation*	3060		T	9	13	1/70	70	20	90	X
	3080	25	T	20	25	12/64	14	2	16	X
	Total						84	22	106	

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AS OF JANUARY 1,1980

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	SIZE	• PURCHASE PRICE ($1,000) BASIC	AVERAGE	DATE OF FIRST INSTALLATION	CUMULATIVE NUMBER SHIPPED IN U.S.	OUTSIDE U.S.	TOTAL	ORDERS FOR 1980 INSTALLATION
Digital Equipment Corp.	PDP-8/a,e,f,m	12	T	4	15	4/71	33,300	15,450	48,750	7,500
	PDP-8/i,l,s	12	T	8	27	5/65	5,765	3,685	9,450	X
	PDP-9,9L	18	T	35	50	12/66	290	160	450	X
	PDP-11/03, LSI-11	16	M	1	2	6/75	55,150	20,350	75,500	36,000
	PDP-11/23, LSI-11/23	16	M	2	6	/79				
	PDP-11/04,05,10,15,20	16	T	5	17	3/70	26,950	15,050	42,000	5,000
	PDP-11/34,35,40	16	T	9	38	1/73	17,200	11,300	28,500	8,000
	PDP-11/44	16	S	23		/80	0	0	0	500
	PDP-11/45,50,55	16	S	24	89	4/72	3,200	1,350	4,550	400
	PDP-11/60	16	S	26	73	6/77	870	900	1,770	600
	PDP-11/70	16	S	60	167	7/75	5,200	2,300	7,500	2,300
	VAX-11/780	32	S	128	225	5/78	600	250	850	700
	PDP-12	12	T	13	46	4/69	510	255	765	X
	PDP-15, XVM	18	T	15	82	2/70	550	320	870	X
	Total						149,585	71,370	220,955	61,000
Digital Microsystems	HEX-29	16	S	13	22	4/79	6	5	11	50
Digital Scientific Corp.	Meta-4/4000	16	S	29	90	4/70	140	15	155	X
	Meta-4/5010	16	S	21	40	10/78	5	0	5	X
	Meta-4/5020	16	T	25	90	4/78	40	0	40	8
	Meta-4/5030	16	S	53	140	5/79	2	0	2	10
	Total						187	15	202	18
Electronic Associates, Inc.	Pacer-100	16	T	15	40	5/72	155	123	278	NA
Foto-Mem, Inc.*	Centaur-100	8	T	6	20	4/70	25	0	25	X
General Automation, Inc.	GA-18/30	16	S	18	50	7/69	780	210	990	X
	SPC-12	8	T	4	16	1/68	3,250	860	4,110	X
	SPC-16	16	T	5	25	5/70	7,210	1,920	9,130	600
	16/110,220	16	M	1	3	12/75	4,240	1,130	5,370	3,500
	16/330,340	16	T	3	10	1/76	335	90	425	0
	16/440,460	16	S	9	30	7/75	1,710	450	2,160	100
	16/550	16	S	25	50	3/78	9	2	11	600
	230, 240	16	M	NA	NA	/80	0	0	0	NA
	470, 480	16	S	NA	NA	/80	0	0	0	NA
	Total						17,534	4,662	22,196	4,800
GRI Computer Corporation	909 Series	16	T	4	9	1/70	320	150	470	X
	99/30, 38	16	T	5	15	6/72	578	268	846	0
	99/10, 18	16	T	3	5	6/72	24	0	24	NA
	99/40, 48	16	T	6	17	6/72	207	278	485	NA
	99/50, 58	16		6	12	/74	146	44	190	NA
	99/52	16		8	17	/76	7	3	10	NA
	Total						1,282	743	2,025	
GT&E	IS/1	16	T	14	36	1/70	160	40	200	X
	IS/1000	16	T	6	10	6/72	4,000	75	4,075	1,000
	Total						4,160	115	4,275	1,000
Harris	6024/1	24	S	69	135	5/69	21	1	22	X
	6024/3	24	S	49	90	2/70	118	1	119	X
	Slash 4	24	S	24	110	8/73	205	18	223	9
	Slash 5	24	S	16	50	5/72	588	24	612	55
	Slash 6	24	S	20	70	12/76	155	8	163	53
	Slash 7	24	S	45	180	10/75	18	1	19	8
	Series 100	24	S	85	190	10/75	37	1	38	3
	Series 200	24	S	179	240	10/75	43	3	46	4
	Series 135	24	S	85	175	9/77	120	22	142	75
	Series 500	24	S	195	300	12/78	72	8	80	125
	Series 800	24/48	S	165	300	6/80	0	0	0	NA
	Total						1,377	87	1,464	332
Hewlett-Packard	2100A	16	T	7	15	6/71	7,900	3,400	11,300	X
	2100 S	16	T	16	36	8/73	1,825	1,425	3,250	X
	2114/15/16	16	T	9	29	11/66	2,495	1,145	3,640	X
	1000-M (MX-M,K)	16	T	2	16	6/74	7,400	5,750	13,150	
	1000-E (MX-E)	16	T	6	22	1/77	4,900	5,600	10,500	8,700
	1000-F	16	T	12	40	9/78	1,150	800	1,950	
	3000 I	16	S	100	200	11/72	1,360	840	2,200	
	3000 II	16	S	100	200	4/76				1,500
	3000 III	16	S	105	200	6/78	590	410	1,000	
	3000-33	16	S	58	135	1/79	230	220	450	500
	3000-30	16	S	50	105	10/79	30	20	50	400
	Total						27,880	19,610	47,490	11,100
HIS-GE/PAC	30	8	T	7	35	5/69	225	50	275	X
	3010, 2	16	T	13	90	5/70	25	1	26	X
Honeywell	112	12	T	5	10	11/69	222	48	270	X
	116/316/416/516	16	T	8	62	10/66	2,405	1,295	3,700	X
	700 Series	16	T	16	65	6/72	1,954	1,531	3,485	X
	164X Series	16	T	144	440	12/69	20	8	28	X
	6/06	16	T	7	42	1/76				
	6/23	16	T	6	25	/78				3,250
	6/33	16	T	4	40	5/78	1,930	780	2,710	
	6/34	16	T	4	18	1/76				X
	6/36	16	T	4	35	1/76				X
	6/43	16	S	7	110	1/77				
	6/47	16	S	19	160	8/78	2,070	1,220	3,290	3,250
	6/53	16	S	19	145	5/78				
	6/57	16	S	44	225	/78				
	Total						8,851	4,933	13,784	6,500
Information Technology, Inc.*	4900/10	16	T	10	20	10/65	25	0	25	X
IBM	Series/1	16	T	5	28	11/76	7,500	3,500	11,000	12,500
Keronix	IDS-16/8	16	T	4	5	4/74				
	IDS-16/10	16	T	3	5	4/74	2,800	250	3,050	320
	IDS-16/12	16	T	3	4	4/74				
Lear Siegler*	VDP-410	16	T	4	4	10/78	100	50	150	X
Lockheed Electronics Company, Inc.	LEC-16	16	T	11	18	3/69	2,590	435	3,025	X
	SUE	16	T	6	11	9/72	2,878	472	3,350	1,000
	Total						5,468	907	6,375	1,000
Microdata Corporation	400	8	T	3	4	1/70	155	0	155	X
	800 Series	8	T	6	11	5/69	2,055	1,380	3,435	X
	1600	8	T	5	11	2/72	9,934	1,836	11,770	1,265
	3200/3230	16	S	8	14	3/74	115	110	225	X
	Micro One	8	M	1	3	11/74	800	120	920	X
	Total						13,059	3,446	16,505	1,265
Minicomp*	MD-708	8	T	5	7	8/70	50	0	50	X
Modular Computer Systems	Modcomp I	16	T	2	9	10/71	698	142	840	X
	Modcomp II	16	T	13	41	3/71	2,118	525	2,643	50
	Modcomp III	16	S	13	44	12/70	72	5	77	X
	Modcomp IV	16/32	S	48	100	5/74	339	130	469	5
	Classic 7810	16	T	8	25	5/79	165	16	181	230
	Classic 7860	16/32	S	38	100	1/78	89	40	129	110
	Classic 7870	16/32	S	64	128	8/78	75	57	132	185
	Classic 7830	16/32	S	29	55	9/79	42	10	52	175
	Total						3,598	925	4,523	755

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AS OF JANUARY 1,1980

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	SIZE	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	CUMULATIVE NUMBER SHIPPED IN U.S.	CUMULATIVE NUMBER SHIPPED OUTSIDE U.S.	CUMULATIVE NUMBER SHIPPED TOTAL	ORDERS FOR 1980 INSTALLATION
Motorola Communications Division*	MDP-1000	8	T	8	19	2/69	75	0	75	X
New England Digital Corporation	ABLE Series 40	16	T	8	10	6/77	100	25	125	25
	ABLE Series 60	16	T	10	12	6/78	75	10	85	25
	Total						175	35	210	50
Omnitec (BIT)*	480	8	T	6	17	12/66	195	3	198	X
	483	8	T	9	33	1/70	115	40	155	X
	Total						310	43	353	
Perkin-Elmer Corporation (Interdata)	1	8	T	4	11	9/70	210	77	287	X
	2,3,4,5	16	T	9	21	5/67	614	153	767	X
	13,15,16,18	16	T	15	33	9/69	14	14	28	X
	50,55	16+1	T	7	33	4/72	133	40	173	X
	70	16	T	9	65	12/71	1,060	342	1,402	X
	74	16	T	3	34	2/73	300	56	356	X
	80,85	16	T	15	50	7/72	70	18	88	X
	5/16	16	M	1	5	1/77	248	67	315	100
	6/16	16	T	2	15	1/76	1,457	642	2,099	400
	7/16	16	T	3	18	2/74	3,673	836	4,509	150
	8/16	16	T	4	25	1/77	357	139	496	250
	7/32	32	S	10	35	7/74	1,177	408	1,585	300
	8/32	32	S	55	160	6/75	556	242	798	200
	Series 16	16	T	5	22	4/79	91	19	110	250
	3220	32	S	34	90	5/79	113	52	165	400
	3240	32	S	85	185	10/79	3	5	8	100
	Total						10,076	3,110	13,186	2,150
Point 4 Data Corporation (a)	Point 4	16		5	7	3/79	350	50	400	1,200
Prime Computer Corporation	100	16	T	6	12	4/73	300	760	1,060	10
	200	16	T	7	22	11/72	420	110	530	10
	300	16	S	12	58	9/73	450	350	800	10
	400	16	S	62	207	6/76	280	120	400	10
	500	16	S	126	330	6/76				
	350	16/32	S	31	116	7/78	80	50	130	200
	450	16/32	S	50	75	2/79	160	100	260	340
	550	16/32	S	70	125	2/79	170	110	280	330
	650	16/32	S	95	165	2/79	20	10	30	100
	750	32	S	130	200	7/79	40	30	70	180
	Total						1,920	1,640	3,560	1,190
Raytheon Data Systems	703	16	T	13	23	10/66	179	33	212	X
	704	16	T	10	18	3/70	700	200	900	X
	706	16	T	19	30	5/69	75	17	92	X
	RDS-500	16	S	17	21	12/73	1,100	225	1,325	NA
	Total						2,054	475	2,529	
Redcor Corporation*	RC-70	16+2	T	15	30	7/68	100	40	140	X
Sperry-Univac	520i	16	T	6	13	9/68	330	170	500	X
	620/a	16	T	[illegible]	75	12/65	120	30	150	X
	620/f, f-100	16	T	10	23	6/70	470	220	690	X
	620i	16/18	T	10	20	12/65	920	380	1,300	X
	620/L + 100C	16	T	5	12	2/71	720	320	1,040	X
	620/L-100	16	T	6	14	6/72	1,091	554	1,645	50
	A620/i, R622/i	16/18	T	15	29	6/69	175	80	255	10
	V-72	16	T	10	45	2/74	990	433	1,423	300
	V-73	16	S	16	45	11/72	1,190	530	1,720	X
	V-74	16	S	40	80	5/74	210	90	300	X
	V-75	16	S	39	80	8/75	120	50	170	X
	V-76	16	S	8	16	1/76	674	309	983	150
	V-77-200	16	M	2	5	1/77	622	216	838	160
	V-77-400	16	T	5	19	12/76	306	230	536	170
	V-77-600	16	S	8	40	3/77	980	243	1,223	340
	V-77-800	16	S	10	50	3/79	18	8	26	400
	Total						8,936	3,863	12,799	1,580
Systems Computer Corp.*	1000	8	T	1	4	1/71	400	200	600	X
Systems Engineering Laboratories	32/30,35	32	S	30	80	9/76	130	30	160	
	32/55,57	32	S	50	125	8/75	510	170	680	250
	32/75,77	32	S	70	150	3/78	260	60	320	
	Total						900	260	1,160	250
Tandem Laboratories, Inc.	T16	16	S	85	130	5/76	592	198	790	NA
Telefile Computer Products	TCP-16/5	16	T	12	17	/77	4	3	7	50
Texas Instruments	960-A/B	16	T	14	30	12/71	3,400	1,600	5,000	NA
	980-A/B	16	S	17	40	10/72	3,450	1,550	5,000	NA
	990/4	16	M	1	8	6/76	6,500	2,200	8,700	NA
	990/10	16	T	20	25	3/76	7,000	2,150	9,150	NA
	990/5	16	M	3	8	3/79	450	150	600	NA
	990/12	16	S	29	70	11/79	25	5	30	NA
	Total						20,825	7,655	28,480	
Two Pi	Two Pi/V32	32	S	125	125	6/78	100	6	106	NA
Unicom, Inc.*	CP-8	8	T	3	8	2/70	343	165	508	X
Unicomp*	Comp-16	16	T	11	29	6/70	26	0	26	X
	Comp-18	18	T	12	38	8/70	38	0	38	X
	Total						64	0	64	
Westinghouse Electric	P-50	14	T	16	23	8/64	182	40	222	X
	P-2000	16	T	10	27	8/69	111	90	201	X
	2500 F	16	T	10	30	11/71	319	115	434	10
	Total						612	245	857	10
Xerox*	CE-16,16/A	16	T	8	23	6/69	35	10	45	X
	Sigma-2	16	T	24	125	12/66	170	80	250	X
	Total						205	90	295	
TOTAL							383,380	157,598	540,978	

Notes

a) Corporate name changed from Educational Data Systems, March 1, 1980.
*) Not currently active in manufacturing or marketing minicomputers.
NA) Data is not available.
X) Indicates minicomputer models not in new production.

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DESKTOP COMPUTER CENSUS

The Desktop Computer Census counts those computers which typically are small enough to be used on a desktop, and are found in a variety of end-user environments including business, home, hobby, personal, educational, and scientific. By IDC definition the Desktop Computer is microprocessor based, includes its own power supply and enclosure, has the capability for attaching output peripherals -- video screen and/or printer -- and can also attach storage devices such as floppy diskettes, tape cassettes, or in some cases fixed disks. The computer is programmable in BASIC or equivalent level language, and costs from less then $1,000 up to $15,000 in a basic configuration. Microcomputer boards and kits are not counted here.

AS OF JANUARY 1, 1980

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	PURCHASE PRICE IN DOLLARS BASIC	PURCHASE PRICE IN DOLLARS AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ORDERS FOR 1980 INSTALLATION
Altos Computer Systems	ACS 8000-6	Z80	9,450	10,000	11/79	150	150	300	2,000
	ACS 8000-2	Z80	4,500	5,000	6/77	1,500	1,200	2,700	5,000
	Total					1,650	1,350	3,000	7,000
APF Electronics	Imagination	6800	600	1,400	11/79	1,000	0	1,000	10,000
Apple Computer Company	Apple II	6502	1,195	2,500	5/77	46,000	12,000	58,000	NA
Associated Computer Industries	ACI 90 System	Microengine	6,695	7,700	6/79	47	200	247	1,594
Atari	400	6502	550	550	9/79	3,000	0	3,000	NA
	800	6502	1,000	1,000	9/79	5,000	0	5,000	NA
	Total					8,000	0	8,000	
BRD, Inc.	Small Fry	6800	7,000	10,000	4/79	50	0	50	NA
CMC Marketing	CMC System 100	Z80	2,930	5,000	1/80	0	0	0	NA
Columbia Data Products, Inc.	500	Dual Z80-A	3,000	3,995	9/79	140	12	152	] 1,500
	900	Dual Z80-A	4,100	4,995	9/79	50	26	76	
	MX	Z80-A	2,495	2,495	12/79	6	6	12	110
	FX	Z80-A	4,495	4,495	2/80	0	0	0	71
	Total					196	44	240	1,681
Commodore	PET/CBM	6502	795	995	10/77	49,000	58,000	107,000	100,000
Compal	8100	8080	9,775	12,000	10/76	400	0	400	10
	8200	Z80	11,995	14,000	1/80	0	0	0	230
	Total					400	0	400	240
Compucorp	625	Z80	5,000	8,500	6/77	200	500	700	NA
	655	Z80	5,000	7,000	4/79	] 500	] 1,000	] 1,500	NA
	665	Z80	5,000	7,000	4/79	]	]	]	NA
	Total					700	1,500	2,200	
Computer Data Systems	Versatile 4	8085	3,800	4,500	11/77	700	150	850	]
	Versatile 3B	8085	4,900	5,500	11/77	250	50	300	800
	Series 80	8085	4,800	12,000	2/80	0	0	0	
	Total					950	200	1,150	800
Computer Hardware, Inc. (Business Machines)	4800	CHI	8,850	8,850	/80	0	0	0	50
Computer Interface Technology	Pense System	Microengine	5,295	8,000	11/79	100	55	155	625
Cromenco	System Three	Z80-A	5,995	10,943	8/77	3,200	300	3,500	NA
Diablo	3000	8085	15,000	17,000	12/79	50	0	50	NA
Digital Equipment Corp.	Mini MINC	LSI-11	9,900	11,000	10/79	80	20	100	500
	Datasystem 150	LSI-11	10,900	15,000	3/79	300	250	550	700
	Total					380	270	650	1,200
Digital Microsystems	DSC-2	Z80-A	4,995	5,895	11/77	3,600	1,250	4,850	8,000
	DSC-2 SBS	Z80-A	9,950	9,950	6/78	250	0	250	400
	DSC-86	Z80-A	5,995		/80	0	0	0	NA
	DSC-86 SBS	Z80-A	12,950		/80	0	0	0	NA
	Total					3,850	1,250	5,100	
Durango Systems	F85	8085A	12,983	13,517	10/78	400	400	800	NA
Dynabyte	DB8/1	Z80	2,295	6,000	/78	817	301	1,118	2,088
	DB8/2	Z80	4,395	8,500	/78	590	207	1,512	1,512
	Total					1,407	508	1,915	3,600
Exidy	Sorcerer	Z80	1,295	2,200	8/78	6,000	6,000	12,000	17,000
Findex, Inc.	100	Z80	4,500	5,980	7/79	24	6	30	700
	128	Z80	8,230	8,980	/80	0	0	0	3
	Total					24	6	30	703
General Robotics*	Polaris	LSI-11	13,000	13,000	4/78	0	100	100	X
Heath	WH89	Z80	2,295	2,500	/79	125	0	125	NA
Hewlett-Packard	9830	HP	4,900	16,500	11/72	5,000	5,000	10,000	X
	9825	HP	5,900	11,000	1/76	22,500	30,500	53,000	]
	9835	HP	9,000	13,000	12/78	1,850	2,250	4,100	] 29,000
	9845	HP	12,000	28,000	11/77	5,500	7,000	12,500	
	Total					34,850	44,750	79,600	29,000
IMSAI*	VDP-40	8085	5,300	5,300	/78	380	20	400	X
	VDP-80	8085	7,800	7,800	/77	670	130	800	X
	Total					1,050	150	1,200	
Industrial Microsystems	5000	8080, Z80	3,300	3,300	6/79	70	50	120	1,000
	8000	8080, Z80	4,700	4,700	6/79	170	110	280	1,000
	Total					240	160	400	2,000
Intelligent Systems	8051	8080A	3,650	4,200	/76	]	]	]	]
	8063	8080A	6,200	9,500	11/79	4,900	2,100	7,000	3,000
	3621	8080A	3,300	3,300	7/79	]	]	]	]
	Compucolor 2	8080A	1,600	1,800	9/78	2,625	875	3,500	2,500
	Total					7,525	2,975	10,500	5,500

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AS OF JANUARY 1, 1980

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	PURCHASE PRICE IN DOLLARS BASIC	PURCHASE PRICE IN DOLLARS AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ORDERS FOR 1980 INSTALLATION
Interactive Computer Systems	MCM 900	2901	9,200	20,000	2/79	100	300	400	200
	MCM 800	Bipolar	8,600	17,000	1/77	50	150	200	X
	MCM 700	8008	7,200	12,000	3/75	50	250	300	X
	Total					200	700	900	200
IBM	5100	IBM	6,300	13,000	11/75	4,300	1,000	5,300	X
	5110	IBM	9,900	17,000	2/78	12,500	2,200	14,700	10,000
	5120	IBM	9,340	15,000	2/80	0	0	0	
	Total					16,800	3,200	20,000	10,000
Intertec Data Systems	SuperBrain	Dual Z80-A	2,995	2,995	10/79	800	200	1,000	9,000
	SuperBrain QD	Dual Z80-A	3,995	3,995	4/80	0	0	0	5,000
	Total					800	200	1,000	14,000
Konix International Corp.	System 80	Z80	3,700	4,000	6/78	53	14	67	150
	System 81	Z80	3,700	4,100	1/80	18	1	19	100
	Total					71	15	86	250
Micro V Corporation	Microstar I	8085A	7,500	15,000	8/78	500	500	1,000	1,300
	Microstar II	8086	12,000	25,000	5/80	0	0	0	500
	Total					500	500	1,000	1,800
Micro Applications Systems, Inc.	Mascot System	6802	5,000	8,000	/80	0	0	0	2,000
Midwest Scientific	MSI-6800AW	6800	5,000	11,000	5/79	300	450	750	1,000
North Star Computers*	Horizon	Z80-A	2,695	3,350	12/77	8,200	1,800	10,000	8,200
Northwest Microcomputers	NMS 85/P	8085	7,200	7,200	1/78	25	3	28	20
Odell Industries*	System 85	8085A	10,450	15,500	6/78	30	0	30	X
Ohio Scientific	Challenger	6502/6800/Z80	1,260	2,500	/78	2,250	250	2,500	NA
Pertec Computer Corporation	PCC 2000	8085A	9,995	13,120	9/78	700	420	1,120	1,700
	MITS 300/25/55	8080	8,080	13,800	/77	1,100	175	1,275	75
	Total					1,800	595	2,395	1,775
Polymorphic Systems	8813	8080	4,700	5,870	9/77	2,000	300	2,300	700
	Twin Systems	8080	6,000	7,500	/80	0	0	0	65
	Total					2,000	300	2,300	765
Processor Technology*	Sol I/II/III/IV	8080A	3,000	6,000	/77	4,500	500	5,000	X
Psytek, Inc.	Psytek 770	Z80-A	7,250	10,000	7/79	15	5	20	180
Quay Corporation	Quay 900	Z80	4,995	4,995	12/79	75	0	75	450
	Quay 500	Z80	2,500	2,500	3/80	0	0	0	200
	Quay 520	Z80	3,200		3/80	0	0	0	NA
	Total					75	0	75	
R2E of America (U.S. Only)	80/20	Z80	2,000	2,500	9/79	0	-	0	1,000
	80/30	Z80	5,000	7,000	7/79	5	-	5	10
	80/40	Z80	7,000	8,500	7/76	20	-	20	10
	80/50	Z80	12,000	15,000	7/75	5	-	5	5
	Total					30		30	1,025
Retail Sciences, Inc.	Clerk 300	Z80	12,000	12,000	8/79	70	40	110	275
Scientific Data Sys., Inc.	SDS 420 Series	6502	7,900	8,800	3/79	75	15	90	40
S.D. Systems	SDS 100	Z80	6,995	6,995	4/78	500	300	800	NA
	SDS 200	Z80	8,995	8,995	5/77	65	30	95	NA
	Total					565	330	895	
Smoke Signal Broadcasting	Chieftan	6800	2,595	3,000	3/79	300	100	400	800
	Chieftan	6809	2,695	3,100	3/80	0	0	0	NA
	Total					300	100	400	
Solid State Technology	Athena 8285	8085A	8,000	10,000	/79	900	1,100	2,000	2,350
Tandy Radio Shack	TRS-80/I	Z80	499	1,000	9/77	139,500	15,500	155,000	110,000
	TRS-80/II	Z80	3,450	5,000	7/79	5,000	0	5,000	
	Total					144,500	15,500	160,000	110,000
Tano Corporation	Outpost II	6800	3,500	4,909	8/78	500	50	550	NA
	Outpost 7	6800	3,000	4,000	8/77	180	20	200	X
	Total					680	70	750	
Tektronix	4051	6800	5,995	17,000	12/75	7,500	4,000	11,500	NA
Texas Instruments	99/4	TI9900	1,150	1,300	/79	2,000	0	2,000	NA
Vector Graphic	System B, MZ	Z80	4,313	5,400	1/79	2,700	900	3,600	NA
	Memowrite	Z80	8,950	8,950	1/79	300	100	400	X
	Total					3,000	1,000	4,000	
Wang Laboratories	PCS1	Wang 2200	5,400	8,000	4/76	800	300	1,100	X
	PCS2	Wang 2200	4,800	10,145	4/77	2,915	1,885	4,800	NA
	Total					3,715	2,185	5,900	
Zeda Computers International	Zeda 580	Z80	6,837	6,837	6/79	47	3	50	3,000
Zenith	Z89	Z80	2,895	2,895	10/79	1,125	125	1,250	2,500
Zilog	MCZ Series	Z80	6,690	9,000	/77	650	550	1,200	200
	MCZ Series A	Z80	8,460	8,460	1/80	0	0	0	NA
	Total					650	550	1,200	
TOTAL						371,042	164,129	535,171	

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• THERE WILL BE A HOT TIME IN EUROPE AS NIXDORF AND OLIVETTI, armed with U.S.-made IBM plug-compatible systems, attempt to fight the Giant for a larger share of the action. Olivetti has signed with IPL Systems for its machines, and Nixdorf recently announced it intends to play the game all the way, buying The Software Company; Nixdorf is mum on the source of hardware.

• AND FUJITSU ESTABLISHES BEACHHEAD WITH TRW in the U.S. A joint venture pact calls for TRW-Fujitsu to market systems from point of sale up through general purpose Fujitsu CPUs. Under the agreement, TRW will phase out of making point-of-sale and financial DP gear by about 1983 and 1987, respectively; these will then be supplied by Fujitsu. The agreement does not cover gear that Fujitsu sells on an OEM basis to Amdahl and Memorex. Fujitsu also OEMs to Siemens. Fujitsu in Japan supplies a full range of CPUs that are compatible with IBM gear. Thus it looks like the States will have another PCM vendor. For the moment, however, the company says it will supply small business systems with Fujitsu's V-830. In 1979, Fujitsu gained 15% of its $2.1 billion revenues from export sales.

• LOCAL LOOPS HEAT UP WITH DEC, INTEL AND XEROX JOINING forces on a scheme based on Xerox's Ethernet to locally link different kinds of equipment. Looks like Xerox contributes Ethernet, DEC processors, and Intel custom chips. The group is open to specification suggestions, but indicated the net will operate at 10M bit/sec on coaxial cable up to 500 meters long. Not much has been heard of IBM's loop scheme unveiled with the 3630 plant system, but that or a close cousin might show up in the Panther, which is supposed to be IBM's update of the OS/6, which probably has a variation of Wang's word processing software. Remember the license trading pact between Wang and IBM? Both firms are mum, but word has it Wang swapped its WP software in return for IBM's bubble technology. Wang has plans to work on speech technology -- hopefully dictation into a terminal is coming soon. Not quite a local loop, but another means of short haul communications, infrared, is expected to be one of the highlights at IBM's booth at the NCC held adjacent to Disneyland.

• AMDAHL HAS OKAYED MARRIAGE WITH STORAGE TECHNOLOGY, although the hardest part seems seems to be finding a name for the new entity. The 1979 combined earnings were $56.9 million (EDP/IR April 14) and revenues $779 million.

• DATA GENERAL LAUNCHES EAGLE 32-BIT MINI, DEC ADDS VAX SOFTWARE. DG's entry in this arena is the MV 8000, which has multiple caches, busses and microprocessors. The system has processors for central processing, system control and I/O, which has 64K of local memory. There's a 16K system cache as well as a 1K instruction cache. Maximum main memory is 2M. Taking a page from DEC's handbook, there isn't a 32 bit Cobol as yet, which indicates DG intends to sell it to the scientific mart first. Prices start at $153K for a bare-bones system with no software, $257K for a medium-scale with AOS/VS and a language. AOS/VS is due by the end of the year. First deliveries are scheduled for October, 1980. DEC recently upgraded its VAX 11/780 operating system to handle 4M of multiport memory in addition to 8M of local memory and endowed it with 32 bit Cobol and Basic and better data retrieval and forms generation. These supermini shipments to the commercial market should pick up. Although there are other VAXs installed in Beta sites, DEC is mum.

• HAPPY NCC -- Apple Computer hosted attendees to a night at Disneyland.

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REVIEW & FORECAST

EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" June 29, 1979 • VOL.15,NO.2&3 P.J.McGOVERN,PUBLISHER

Recession resistance?

1978 AND FIRST HALF OF 1979 MEET OR EXCEED FORECASTS

After three successive years of more than 17% annual growth, computer shipments will increase only 11% during 1979 and continue at the 11%-to-12% rate each year into the middle 1980s. Other sectors will do even better.

Does this suggest a spending downturn? For 1979, perhaps, although the trend toward purchase continues. More significant: 1) Substantially more processing power is continually available for the dollar; 2) the trend toward distributed processing involves terminal and datacomm equipment, gear that IDC doesn't add into the computer shipment figure being considered here -- the $18.8 billion for 1979 that is expected to grow to $34.4 billion in 1983.

One of the big questions these days is whether or not a recession is expected. Indeed, triggered by events such as escalating oil prices, recession may be a self-fulfilling prophesy. But at the National Computer Conference earlier this month, there was evidence only of happy days.

A picture of boom times bubbled forth, all records were broken. More than 66,000 attendees traipsed through four floors of the New York Coliseum, one floor of overflow exhibits at the Hilton, and another floor of personal computer exhibits at the Sheraton Center (nee Americana). Exhibitors generally assessed the crowd as knowledgeable and interested in buying.

In general, elasticity of the marketplace appears to be the overriding observation -- from NCC and for the entire information processing industry. And closely related, is productivity. New products continue to offer new or better performance -- at the same or lower prices. And with each technological advance or price/performance break a new level of user seems ready to invest in productive equipment.

All the mainframers except DEC have dramatically increased price/performance ratios with new lines of products and price reductions, especially in the memory area. Terminal makers are incredulous at the demand; a couple say their 30% annual production increase is inadequate to meet orders.

Indeed, the past 18 months have seen many trends grow stronger, and some realities emerge from concepts. Specifically:

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- Mainframers improved the price/performance of their products and nearly all introduced new families of processors. Better price/performance ratios stem in part from higher density memories (usually 16K-bit chips). More microcode is common as is the use of cache memory. Systems generally require less power, thus reducing the costs of operation.

- Separate pricing of software. IBM partially unbundled its operating software on the 4300s and Univac separately prices applications software on its new 1100/60. This tends to exaggerate the improvement in hardware price/performance and to complicate comparisons of systems.

- Easier-to-use systems through query languages, easier screen formatting capabilities, and friendly data base management systems.

- The plug-compatible CPU continued to come into its own with more vendors joining the fray, many of them services companies. But the expectation of and then the announcement of the IBM 4300 seems to have cast a temporary pall on some orders. Now the PCM makers emphasize prompt shipments as IBM delivery schedules stretch into the early 1980s.

- Distributed processing, although still elusively defined, seems to be more of a reality than a concept -- a change from a year and a half ago. Now it's up to the software types to provide solutions to problems such as concurrency and robustness when data bases are scattered.

- There is distribution of intelligence within the CPU. Designers have discovered that microprocessors at various points such as the I/O can improve performance.

- Communications took some large leaps forward, thanks in part to the emphasis accompanying distributed processing.

  + Nearly all mainframers' networking offerings promise X.25 compatibility, although not all offer X.25 at the moment. Such a trend indicates recognition that parochialism, although tending to lock users in, just isn't the wave of the future. Univac's new Distributed Communications Processor, the DCP/40, handles X.25 and can be adapted for use with other makes of CPUs, Univac said at the NCC announcement.

  + Ability to communicate with IBM systems is becoming more prevalent as mainframers, minimakers and key-to-disk vendors alike endow their terminals with this feature.

  + There will be no dearth of choices of communications networks. AT&T's Advanced Communications Service (ACS) for the small to medium user; Xerox's Xten for the mid-size user and IBM's Satellite Business System (SBS) for the large corporation.

  + The Federal Communications Commission is making competition the byword. AT&T is finding others in its long distance arena: MCI,

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Southern Pacific et al have gained that right after some battles in court. Lately, Computer Inquiry II has proposed a hybrid category that obviates the need to clearly define (regulated) communications and (unregulated) DP boundaries.

- The antitrust arena continues without many waves. The Memorex case concluded, Transamerica took its turn at bat and should conclude shortly, Greyhound is getting ready to try again, and CalComp got shot down on appeal. Meanwhile, U.S. vs. IBM marks its tenth year since filing, and drones on. But now IBM is giving its defense.

- The Federal government adopted the proposed channel level I/O interface standard in its procurement policies.

General purpose computers

The annual increases in value of shipments for general purpose computers will show a smaller rate of growth after 1979 because of the bulge from 303X shipments and the correspondingly larger size of the base. For instance, the annual increment in dollar value of worldwide shipments from 1978 to 1979 was 16.1%, whereas it is expected to be 7.2% from 1979 to 1980. Recovering from the 50% and above levels of 1970-1974, retirements as a percentage of shipments hit a low of 22% in 1978. This ratio is expected to hit 30% in 1979 and it should increase to 35% by the middle 1980s.

Perhaps IBM's biggest move has been to enter the field of distributed processing (IBM has started talking about "cooperative network processing") via the 8100 and later with the 4300. It has also made SNA less exclusive. Now, through such means as the newer S/1 and other devices, users can link their older terminals to an SNA net.

WORLDWIDE GENERAL-PURPOSE COMPUTER MARKET FOR U.S.-BASED MANUFACTURERS
(Copyright 1979 by International Data Corporation)

	1978 Shipments		In Use Yearend 1978		
	$M	% Total	$B	% Total	1977-78 Change
IBM	$9,525	66.6%			
PC Peripherals	700	4.9			
Itel	350	2.5			
Amdahl	315	2.2			
Total IBM Base	10,890	76.2	$64.3	72.4%	+ 17.1%
Sperry Univac	950	6.6	6.6	7.4	+ 13.8
HIS + Xerox	820	5.7	7.0	7.9	+ 11.1
Burroughs	750	5.3	5.0	5.6	+ 13.6
CDC	340	2.4	2.9	3.2	+ 11.5
NCR	320	2.2	1.9	2.2	+ 8.0
DEC	190	1.3	0.8	0.9	+ 33.3
Others	40	0.3	0.4	0.4	+ 25.0
TOTAL	$14,300	100.0%	$88.9	100.0%	+ 14.3

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Also, IBM set the world on its ear a couple of times with memory prices, and let loose a clear signal that its laboratories have been productive. There is awesome technology behind IBM's 64K memory, and its capability to design and fabricate this type of memory and dense logic chips. Memory suppliers are still quaking after the last volley, which priced memory on the 4300 at 15 cents/byte. Other mainframers have suddenly dropped their memory prices also, as have some minimakers.

On the small systems front, GSD has been active, with perhaps the most notable product being the System/38 that has one-level memory management and an integrated relational data base management system that looks like big brother's experimental System R.

Univac tied tighter the link between it and its minicomputer area, formerly Varian, via software. But it waited until NCC to unveil its answer to increased price/performance, the 1100/60 line. With five uniprocessor and two multiprocessor models that succeed all other models of the 1100 family except the top of the line 1100/80, the 1100/60 establishes a lower entry level price into the 1100 line, with performance starting at that of a 4331 and ranging up into the 303X area. Univac indicated it intends to help users cross the span between the 90 and 1100 series via compatible peripherals and compilers.

Control Data, not about to let Cray walk away with the only really big number cruncher, unveiled its answer, the Cyber 270. It expanded its range of Omegas for the IBM-compatible trade with the 480-III and cut prices on its I and II. CDC managed a whopping 105% rise in earnings from its computer operations during 1978 -- which includes its services offerings and sales of OEM and IBM-compatible peripherals. In the process, CDC continued its policy of spanning the globe for business and being vociferous about the U.S. constraints to trade in the DP area.

Burroughs had some trouble delivering its B 7800, which incorporated advanced logic techniques, but did manage to ship one to Japan. In other areas, it jumped into the price/performance game with the first models of its B 900 series, the B 2930 and B 3950. The Motown maker's range of new modular terminals -- small and designed for specific uses -- seems designed to give NCR some competition.

Honeywell revamped its current lines to conform with others' price specs, creating two smaller Level 66s, the DPS 440 and 520. Two Level 64s, the DPS 320 and 350, are priced below the previous bottom of the line. HIS also is upgrading models available to its Xerox base, enhancing its minis as well as its mainframes, and endowing both its Xerox and HIS mainframes with updated operating systems.

With its acquisition of Incoterm, HIS indicated it too is interested in courting specific industry markets, as exemplified in its recent announcement for the manufacturing segment. Furthermore, the combination of Incoterm controllers and terminals and the Level/6 mini should give HIS a range of offerings in distributed environs.

NCR's 85X5 -- the V8455, V8555M, V8575M and V8585M -- succeed the V8500 models and can become multiple processor systems with other members of the family. The NCR family appears to sit aggressively on the price/performance curve charted by IBM's 4300s.

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Minis growing up

With the growth of the supermini, and the user's desire to add goodies onto a bare mini, IDC has revised downward its estimate of the number of minis shipped and increased the average value of equipment shipped. The number of minis shipped worldwide is expected to more than double over the next five years, from 100,000 in 1978 to 235,000 in 1983. Meanwhile, the value of these shipments will more than triple, from $3.1 billion in 1978 to $10.3 billion in 1983. The value of the installed base worldwide should more than quadruple during the next five years while the number more than doubles.

Superminis should continue to account for about 41% of the value of U.S. shipments and 9% of the units, while the value of micro shipments by these makers should double to 12% by 1982.

Mini manufacturers have been actively marketing to the end user to offload central processors and also to fit into distributed processing schemes. Meanwhile, they have been busy fortifying their newfound preserve of the end user by adding some sophisticated networking capabilities that in some cases rival or outdo mainframe offerings. A few instances of the new networks are Primenet, Tandem's Access, and Computer Automation's Virtual net, all of which support X.25.

This end-user market means possible mainframe competition. As a shelter, the suppliers have found they must make a higher level of commitment to software. If the minimakers can provide adequate, easy to use software with such goodies as data base management systems and data dictionaries, as well as industry-specific software packages, they should have some protective armor.

WORLDWIDE MINICOMPUTER MARKET ACTIVITY

	$M Revenues			Units Shipped		
	1977	1978	% Share	1977	1978	% Share
Digital Equipment	1100	1420	39	37,500	47,500	47
Hewlett-Packard	390	535	15	6,000	8,000	8
Data General	279	410	11	11,600	12,900	13
HIS	130	200	5	1,600	2,000	2
Perkin-Elmer	86	113	3	2,000	2,100	2
General Automation	83	111	3	2,650	2,600	3
Texas Instruments	80	110	3	5,000	6,000	6
Prime	50	94	3	626	670	1
IBM	30	80	2	1,150	2,800	3
Microdata	38	76	2	996	1,380	1
Computer Automation	52	68	2	5,228	6,000	6
ModComp	54	65	2	703	800	1
SEL	35	50	1	165	300	neg.
Harris	32	40	1	235	300	neg.
Univac	36	38	1	1,200	1,050	1
Tandem	11	31	1	76	90	neg.
Others	174	209	6	5,271	5,510	6
TOTAL	$2,660	$3,650	100%	82,000	100,000	100%

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Mini makers are attempting to protect their low-cost flank as well and in many cases have micro-based systems on the market to do battle with offerings from the semiconductor vendors. Most likely the real battleground between the mini makers and the semi houses will be in the small business field, where often a couple of micros comprise the guts of a system. Minis also face potential competition, at least at the OEM level, from terminal vendors who are incorporating micros into the terminals themselves rather than using minis as the force behind clustered processing terminals. Minimakers trying to retain this business are making their systems easy for the OEM to program. In addition, they are starting to supply such goodies as data base management systems and data dictionaries.

Minis are becoming an increasingly important part of mainframers' product lines and are proving valuable marketing tools. Honeywell has probably done as good a job if not better than any other vendor in using its minis to land sales of larger processors for distributed processing. Univac is showing signs of bringing its Varian acquisition into the fold, while IBM's General Systems Division is still trying to do its own thing (i.e. be a mini vendor) with the Series/1.

Some idea of the growing importance of the mini mart to the overall industry can be gleaned when one considers that the value of worldwide mini shipments in 1974 was less than one-tenth that of general purpose computers and in 1978 was about one quarter. In 1983, the value of minis shipped should be about one-third that of the general purpose computers.

The small business market

Just as hot and perhaps more widely talked about is the small business computer business. Up 35% in 1978, shipments this year are estimated to be ahead another 21%, topping $2 billion for U.S.-based manufacturers worldwide.

Three types of vendors -- mainframers, minimakers, and independents -- use a variety of marketing approaches to go after the nearly 500,000 business establishments that are the target. In addition to a sales force, the suppliers use distributors, systems houses, service bureaus, and retail stores to hawk their wares. Radio and TV ads supplement regional trade shows and trade publication advertising.

With about 13,000 unit shipments in 1978, IBM took 32% of the small business computer market. Wang was second with some 6,000 shipments, followed by Burroughs (4,280), DEC (3,250), NCR (1,900), and Basic Four (1,500). The other 10,000 systems shipped were supplied by more than 60 different types of organizations.

Terminals are booming

The terminal market is divided into several sectors -- each with its own growth pattern, and all of which are contributing to the trend toward making terminals omnipresent. The largest sector is the U.S. general purpose data entry/terminal equipment market, which should more than double in the next five years from the 1978 base of 2.27 million units installed to 5.07 million in 1983. IBM holds the largest share, with 26.7% of the installed base, which includes CRTs, keyboard/printers, and machine-oriented devices such as OCR and remote-batch terminals.

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Makers of conversational (dumb) CRTs claimed a record year in 1978, with many shipping 20,000 to 40,000 terminals. The U.S. installed base at year end was 278,700 units. The U.S. editing CRT terminal market, with 494,000 of IBM 3270-type devices installed at the end of the year, shows IBM's share of the market has been decreasing -- to 52.4% at the end of the year.

But IBM, with its 3278, became more competitive. Delays in deliveries -- only between 7,000 and 8,000 were shipped -- prevented the new version from having more of an impact on the market. Those vendors whose products have the IBM's communications scheme -- synchronous data link control (SDLC) -- will have an edge on the other independents.

In the processing terminal arena, most of the growth potential lies in the clustered approach rather than single stations. One reason why the single station area is still growing is the number of new entrants with their intelligent terminals. The clustered approach is slated for high growth -- 37% a year -- thanks in part to the fact the IBM 8100 is included in this category. At yearend 1978, Four Phase and Datapoint were fighting for supremacy with a 32% and 30% share of the market, respectively.

The application-unique terminal market should grow at about 20%/year, more than doubling from 780,000 devices in 1978 to 1.8 million in 1983. The source data entry sector should show the most growth, whereas the stock quotation market is reaching saturation and the retail sector should decline slightly due to retirement of some credit authorization devices (that function can be done by newer POS systems.) Examples of sectors using source data entry are manufacturing, sales reporting and betting and gaming.

Services growing with CPUs

The services sector expanded on the old adage "if you can't beat 'em join 'em" with vigor. At least four companies announced offerings that presented the user with his own onsite system, frequently hooking into the service's facilities if needed.

Revenues of U.S. suppliers of processing services should grow at a compound rate of 17% through 1983, when the total will reach $10.7 billion, led by a 24% compound growth in the remote autotransaction sector. Meantime, carry-in batch will merely grow at a compound rate of 7%, but will still be nearly the size of remote problem-solving, which is slated to grow at 20%.

Firms entering into the hardware territory often based their equipment selection on compatibility of software with their own software offerings. National CSS elected Two Pi because its its Nomad data base system and its operating system are fine tuned to run on IBM-type products. And ADP, a DEC-based house, chose the DECsystem 2020 as its representative. Although there are slight differences in whether they sell or lease their systems, the fact remains their value added lies in their software expertise.

Services firms discovered the acquisition game, and played it with a vengeance. Many bought specialty houses while some also grabbed at smaller, formerly batch-oriented shops, and tried to bring them into the world of online. Itel, notable for its past acquisitions, has been quietly dumping some of its efforts in this field lately. But the trend is there -- the big get bigger and the small get bought out.

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MARKET FOR PROCESSING SERVICES
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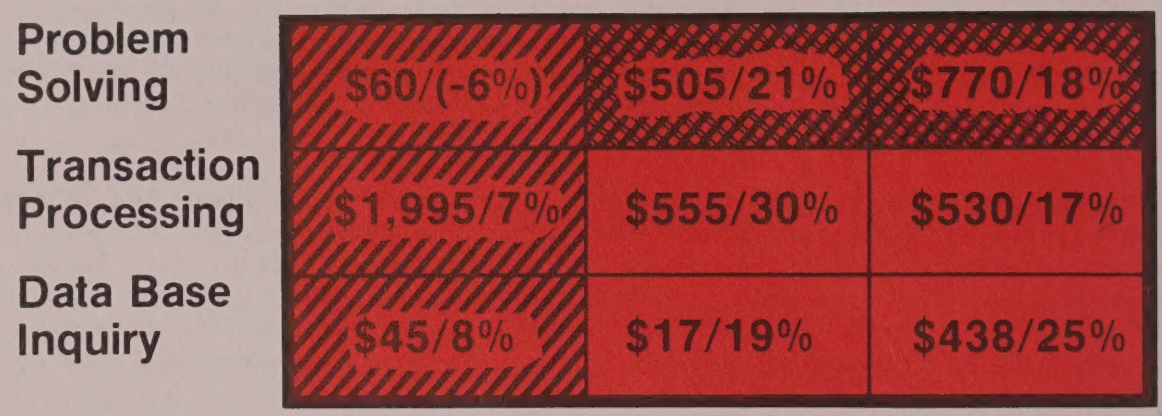

The number of vendors reaping more than $100 million in revenues grew from eight last year to 10: CDC, CSC, ADP, EDS, GE, SDC, McAuto, Tymshare, PRC, and Bradford. Informatics was almost there with $92.5 million. Of course, the number of participants in the U.S. services industry adds up to nearly 3,000 organizations.

Although IBM is now allowed to compete in the services market, it has been remarkably quiet about its plans, if any. EDP/IR suspects we will see IBM in the services sector in conjunction with its Satellite Business Systems offspring.

Software sales no slouch

Prompted by the scarcity of good people, worldwide revenues of U.S.-based suppliers of independent packaged software should rise by a hefty compound annual rate of 28% through 1983, when the total revenues should reach $2.3 billion from its 1978 base of $670 million. Applications packages, with a 31% growth, will outpace the systems and utility sectors, and grow from 48% share of the pie to 55% in 1983.

In the software field, there were 14 suppliers whose revenues exceeded $10 million. Only two vendors, UCC and Informatics, are active in all three segments of the business.

INDEPENDENT PACKAGED SOFTWARE REVENUES
(Copyright 1979 by International Data Corporation)

Type	1978	% Per Yr.	1983
Systems	$102M	16%	$ 218M
Utility	243	27	806
Application	325	31	1,276
TOTAL	$670M	28%	$2,300M

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COMPUTER MARKET SUMMARY (U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	67,850	264,690	$ 12,000	$ 58.5
1975	71,900	323,740	12,250	67.1
1976	92,040	392,830	13,300	76.6
1977	128,470	496,760	16,000	89.0
1978	144,410	619,320	18,800	104.2
1979	168,800	764,400	22,250	120.9
1980	204,500	932,600	24,700	139.2
1981	246,600	1,133,500	27,600	159.6
1982	292,800	1,377,200	30,850	182.4
1983	340,100	1,663,400	34,350	208.1
		UNITED STATES		
1974	46,300	171,240	$ 7,100	$ 33.3
1975	48,300	208,640	6,650	37.8
1976	61,240	253,580	7,100	43.3
1977	87,580	322,320	8,900	50.3
1978	96,540	401,460	10,300	58.6
1979	111,200	492,200	12,150	67.7
1980	132,500	596,100	13,500	77.7
1981	159,500	720,500	15,150	88.8
1982	187,800	870,200	16,950	101.2
1983	218,500	1,046,800	18,950	115.3
		INTERNATIONAL		
1974	21,550	93,450	$ 4,900	$ 25.2
1975	23,600	115,100	5,600	29.3
1976	30,800	139,250	6,200	33.3
1977	40,890	174,440	7,100	38.7
1978	47,870	217,860	8,500	45.6
1979	57,600	272,200	10,100	53.2
1980	72,000	336,500	11,200	61.5
1981	87,100	413,000	12,450	70.8
1982	105,000	507,000	13,900	81.2
1983	121,600	616,600	15,400	92.8

This is the total of all general-purpose computers, minis, small business computers (SBCs), and "other" systems such as IBM's S/7. Minis used in SBCs are subtracted to eliminate double counting. Detailed tables follow. (General-purpose and SBC tables are mutually exclusive, but the minicomputer table includes computers subsequently shipped to users -- by the minimakers or by systems houses -- as small business computers.)

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GENERAL-PURPOSE COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	16,000	111,300	$10,700	$ 54.2
1975	13,800	115,400	10,610	61.3
1976	14,800	112,500	10,830	68.6
1977	17,800	112,800	12,500	77.8
1978	10,600	113,200	14,300	88.9
1979	12,400	118,400	16,600	100.5
1980	20,000	125,200	17,800	112.6
1981	20,500	130,800	18,800	125.0
1982	18,500	136,100	19,800	137.8
1983	16,500	141,400	20,800	151.1
		UNITED STATES		
1974	8,600	61,500	$ 6,200	$ 30.2
1975	6,700	62,100	5,610	33.8
1976	7,200	59,600	5,530	37.9
1977	8,900	58,200	6,600	42.9
1978	4,600	58,000	7,400	48.7
1979	5,800	59,800	8,600	54.7
1980	10,000	62,300	9,200	60.9
1981	10,000	64,300	9,700	67.2
1982	9,000	66,200	10,200	73.7
1983	8,000	68,000	10,700	80.4
		INTERNATIONAL		
1974	7,400	49,800	$ 4,500	$ 24.0
1975	7,100	53,300	5,000	27.5
1976	7,600	52,900	5,300	30.7
1977	8,900	54,600	5,900	34.9
1978	6,000	55,200	6,900	40.2
1979	6,600	58,600	8,000	45.8
1980	10,000	62,900	8,600	51.7
1981	10,500	66,500	9,100	57.8
1982	9,500	69,900	9,600	64.1
1983	8,500	73,400	10,100	70.7

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SMALL BUSINESS COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	4,150	6,200	$ 200	$ .3
1975	10,600	16,800	400	.7
1976	22,400	39,200	880	1.6
1977	32,500	71,700	1,280	2.9
1978	40,100	110,300	1,725	4.5
1979	49,000	156,200	2,090	6.5
1980	58,700	210,600	2,440	8.8
1981	72,400	277,000	2,870	11.4
1982	88,000	357,800	3,340	14.4
1983	104,900	454,200	3,850	17.9
		UNITED STATES		
1974	3,000	4,500	$ 150	$ .2
1975	7,900	12,400	300	.5
1976	14,800	27,200	580	1.1
1977	21,600	48,800	840	2.0
1978	25,500	72,800	1,105	3.0
1979	30,300	100,900	1,300	4.2
1980	35,700	133,800	1,500	5.6
1981	43,500	173,400	1,740	7.2
1982	52,200	220,900	1,980	8.9
1983	61,600	277,000	2,250	11.0
		INTERNATIONAL		
1974	1,150	1,700	$ 50	$ .1
1975	2,700	4,400	100	.2
1976	7,600	12,000	300	.5
1977	10,900	22,900	440	.9
1978	14,600	37,500	620	1.5
1979	18,700	55,300	790	2.3
1980	23,000	76,800	940	3.2
1981	28,900	103,600	1,130	4.2
1982	35,800	136,900	1,360	5.5
1983	43,300	177,200	1,600	6.9

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MINICOMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	46,600	135,300	$ 940	$ 2.7
1975	48,600	181,400	1,185	3.8
1976	58,400	235,300	1,600	5.2
1977	82,000	311,200	2,315	7.4
1978	100,000	402,300	3,065	10.2
1979	115,000	504,700	3,865	13.7
1980	135,000	621,500	4,845	18.2
1981	165,000	761,700	6,355	24.0
1982	200,000	932,600	8,240	31.6
1983	235,000	1,132,600	10,300	41.0
		UNITED STATES		
1974	33,900	96,100	$ 630	$ 1.9
1975	34,500	126,300	735	2.5
1976	42,000	162,300	1,025	3.4
1977	60,000	214,500	1,550	4.8
1978	71,000	275,300	1,990	6.5
1979	80,500	342,100	2,475	8.7
1980	93,200	417,400	3,055	11.4
1981	113,800	508,000	4,005	14.9
1982	136,000	617,500	5,110	19.5
1983	160,000	746,800	6,400	25.2
		INTERNATIONAL		
1974	12,700	39,200	$ 310	$ .8
1975	14,100	55,100	450	1.3
1976	16,400	73,000	575	1.8
1977	22,000	96,700	765	2.6
1978	29,000	127,000	1,075	3.7
1979	34,500	162,600	1,390	5.0
1980	41,800	204,100	1,790	6.8
1981	51,200	253,700	2,350	9.1
1982	64,000	315,100	3,130	12.1
1983	75,000	385,800	3,900	15.8

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Most systems software comes from the CPU manufacturer, but the independent portion is slated for a 16% compound growth rate during the next five years. The fastest growing subsegment will be communications software, which should grow 19% a year and reach the $50 million level by 1983. The area of system resource management comprises the largest submarket, pegged at $55 million in 1978. Although the IBM 4300 announcement will not affect much of the software industry this year, the early 1980s could see new growth in traditional mainframe sectors such as operating systems and compilers/assemblers.

The utility software market should more than triple by 1983. It is highly fragmented and relatively easy to enter as the development cost seems to be lower than for other areas. There is limited competition from hardware suppliers and the users view this type of software as a help to them rather than as a threat to their jobs. Data management software should account for half of the utility software sector's revenues by 1983, growing from $95 million in 1977 to $440 million in 1983.

The applications market, paced by such standbys as payroll and personnel packages, should have revenues over $1 billion by 1982. Other strong areas are: manufacturing, general accounting, banking/finance and insurance. Other emerging areas include office automation and health care.

TIDBITS FROM NCC

Word has it that IBM has asked AT&T to testify in the U.S. vs. IBM antitrust trial. The thesis would be that regulation has hindered AT&T and therefore enabled IBM to get a larger share of the market than it might have with an unregulated AT&T around.

It's really no surprise that IBM's marketeers still rule the roost. Or, relax, you 1,500 IMS users who are worried that System R may obsolete your IMS investment. You'll have your DL/1 handle onto IMS as a security blanket till the cows come home. But there could well be future enhancements above and below the IMS that could give it more functionality similar to System R features, according to a developer of System R.

And for those fans of IBM's experimental relational data base (System R), look at the 38. Although there was no collaboration between the GSD group and the San Jose researchers who developed R, the 38 does indeed look very much like System R, according to one of R's developers.

IBM's President John Opel, keynote speaker at NCC, foresees that logic gates, etc., will be 100 times what they are today at 1/20th the cost by the late 1980s.

Teletype Corp.'s executive vice-president, Roger Moody, a former Bell executive, has his own ideas on how Ma Bell should reorganize. The current geographical lines no longer make sense, he observed. Rather, the company should be geared to serve the customer both on premises and via long lines etc. Long Lines probably will be the means to develop this force, but whether it will still be Long Lines depends -- the charge might go to Bolger or McGill, he speculated.

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GENERAL-PURPOSE COMPUTER CENSUS

Counts in the General-Purpose Computer Census are based on the best information available to IDC -- but are estimates nevertheless. Computer makers, as a rule, do not directly supply this type of data. General-purpose computers -- as characterized by IBM's 370, 303X and competitors -- comprise the bulk of digital computers by value. They are primarily character or byte oriented and programmed in higher-level language.

Instead of being pegged to constantly shifting average values, size classes are based on currently marketed IBM products and other manufacturers' models that compete with them, e.g., a computer in Size Class 7 would compete with an IBM 3033 or 168. (Other classes can be checked under IBM's column.) Note that many mainframe manufacturers also offer smaller systems that are included in the Small Business Computer Census. An "x" in the last column means none on order from the original manufacturer.

AS OF JANUARY 1, 1979

NAME OF MANUFACTURER	COMPUTER MODEL	SIZE CLASS	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Amdahl	470V/5	6	$ 60,000	9/77	28	8	36	35
	470V/6	7	$ 83,000	6/75	113	41	154	85
	470V/7	7	$ 89,000	8/78	9	4	13	30
	470V/8	7	$ 90,000	9/79	-	-	-	10
	Total				150	53	203	160
Burroughs	B2/3/500	3	$ 6,600	11/61	365	245	610	X
	B1710	2	$ 2,700	8/72	1,110	620	1,730	X
	B1720	3	$ 6,900	2/73	560	280	840	X
	B1820/30	2	$ 3,000	5/77	70	80	150	175
	B1860/70	3	$ 6,500	5/77	225	125	350	425
	B2500	4	$ 10,400	2/67	40	60	100	X
	B2700	4	$ 10,700	8/72	375	200	575	X
	B2800	4	$ 11,900	12/76	95	26	121	90
	B3500	4	$ 19,000	5/67	285	245	530	X
	B3700	4	$ 25,000	11/72	335	275	610	X
	B3800	4	$ 17,800	4/77	75	30	105	120
	B45/4700	5	$ 32,000	10/71	340	135	475	X
	B4800	5	$ 36,000	9/76	80	55	135	90
	B5500	5	$ 35,000	3/63	37	14	51	X
	B5700	5	$ 33,500	12/70	4	6	10	X
	B65/6700	6	$ 66,000	11/69	160	110	270	X
	B6800	5	$ 47,500	6/77	65	50	115	100
	B7700	7	$142,000	8/73	37	21	58	5
	B7800	7	$150,000	11/78	2	1	3	20
	Total				4,260	2,578	6,838	1,025
CDC	Omega 480-1	4	$ 10,700	6/77	48	-	48	60
	Omega 480-2	5	$ 14,200	8/78	2	-	2	5
	Cyber-71	4	$ 20,000	7/76	4	9	13	5
	Cyber-171	4	$ 27,000	8/77	9	29	38	35
	Cyber-72	5	$ 41,000	10/71	14	48	62	X
	Cyber-172	6	$ 48,000	7/75	28	42	70	15
	Cyber-73	6	$ 62,000	3/72	21	36	57	X
	Cyber-173	6	$ 79,000	9/75	10	38	48	5
	Cyber-74	7	$141,000	3/72	29	16	45	X
	Cyber-174	6	$ 97,000	9/75	10	14	24	2
	Cyber-175	7	$147,000	8/75	20	30	50	30
	Cyber-76	7	$184,000	3/72	7	10	17	X
	Cyber-176	7	$184,000	1/78	6	2	8	10
	G-20	4	$ 19,300	4/61	3	-	3	X
	1604	6	$ 41,000	1/60	8	-	8	X
	31/3150	4	$ 9,700	12/64	48	19	67	X
	3170	5	$ 22,500	12/70	19	17	36	X
	3200	4	$ 14,700	5/64	31	20	51	X
	3300	5	$ 34,500	9/65	86	50	136	X
	3400	5	$ 23,500	11/64	3	3	6	X
	3500	5	$ 31,000	1/69	30	10	40	X
	3600	6	$ 49,000	6/63	16	13	29	X
	3800	6	$ 60,000	12/65	12	2	14	X
	6200	6	$ 44,000	11/70	-	3	3	X
	6400	6	$ 63,000	5/66	47	33	80	X
	6500	6	$ 86,000	12/67	15	12	27	X
	6600	7	$116,000	8/64	49	21	70	X
	6700	7	$140,000	7/70	3	-	3	X
	7600	7	$195,000	1/69	23	6	29	X
	Star-100	7	$280,000	12/74	4	-	4	X
	Cyber-203	7	$210,000	/79	-	-	-	5
	Total				605	483	1,088	172
Cray	Cray 1A	7	$196,000	4/76	6	2	8	8
DEC	2020	3	$ 6,900	7/78	60	5	65	125
	2040	4	$ 10,900	6/76	85	65	150	25
	2050	4	$ 19,500	5/77	70	30	100	70
	2060	5	$ 22,500	2/79	-	-	-	20
	PDP-6	4	$ 10,000	10/64	6	1	7	X
	1040/50	4	$ 17,300	10/67	140	110	250	X
	1060/70	5	$ 21,000	6/72	140	100	240	30
	1080/90	6	$ 30,500	6/75	135	65	200	60
	Total				636	376	1,012	330
Honeywell	H-61/40	2	$ 2,100	6/76	-	470	470	]
	H-61/58	2	$ 2,300	6/74	120	660	780	] 250
	H-61/60	2	$ 3,300	6/74	75	1,040	1,115	]
	H-Level 62	3	$ 5,200	10/74	630	880	1,510	400
	H-Level 64	4	$ 11,200	10/74	270	610	880	220
	H-66/05/07	4	$ 18,100	10/76	73	120	193	100
	H-66/10/17	5	$ 29,000	6/75	69	100	169	30
	H-66/20/27	5	$ 40,000	11/74	90	120	210	15
	H-66/40/60	6	$ 80,000	10/74	87	83	170	30
	H-66/DPS	6	$ 71,000	7/78	2	1	3	35
	H-66/80	7	$120,000	10/74	15	16	31	10
	H-68/80	7	$102,000	10/74	15	2	17	X
	H-68/DPS	7	$121,000	9/78	1	1	2	10
	S-60 Subtotal				1,447	4,103	5,550	1,100
	G-50	2	$ 1,900	8/70	195	1,150	1,345	X
	G-100	3	$ 4,900	4/66	85	975	1,060	X
	G-200	4	$ 10,000	4/61	110	18	128	X
	G-400	4	$ 15,900	5/64	195	160	355	X
	G-600	6	$ 77,000	4/65	35	21	56	X
	G-6023/25	5	$ 33,000	11/73	31	26	57	X
	G-6030/40	5	$ 43,000	6/71	53	120	173	X
	G-6050/60	6	$ 73,000	7/71	88	64	152	X
	G-6070/80	6	$111,000	7/71	55	32	87	X
	G-6180	7	$108,000	2/74	3	-	3	X
	Gamma 10	2	$ 2,500	7/64	-	590	590	X
	Gamma 30	4	$ 10,000	2/62	-	43	43	X
	G-Subtotal				852	3,199	4,051	X
	H-105/115	3	$ 6,400	3/70	210	240	450	X
	H-110/120/200	3	$ 6,600	1/66	340	230	570	X
	H-125	4	$ 8,600	12/67	18	120	138	X
	H-2020/30	3	$ 4,400	1/73	505	175	680	X
	H-1015/2015	4	$ 18,500	2/71	55	40	95	X
	H-1200	4	$ 14,600	2/66	200	76	276	X
	H-2040	4	$ 13,700	4/72	210	120	330	X
	H-2050/2060	4	$ 21,000	4/72	143	112	257	X
	H-2200	4	$ 20,000	1/66	89	27	116	X
	H-2070	5	$ 36,000	5/72	31	2	33	X
	H-3200	5	$ 28,500	2/70	85	36	121	X
	H-4200	5	$ 46,500	9/68	10	3	13	X
	H-8200	6	$ 71,000	2/69	14	10	24	X
	H-4/1400	4	$ 13,500	12/61	12	14	26	X
	H-8/1800	5	$ 35,000	12/60	10	12	22	X
	H-Subtotal				1,934	1,217	3,151	X
	Total				4,233	8,519	12,752	1,100

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AS OF JANUARY 1, 1979

NAME OF MANUFACTURER	COMPUTER MODEL	SIZE CLASS	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
IBM	System/38-3	2	$ 3,600	8/79	-	-	-	5,000
	System/38-5	3	$ 9,700	2/80	-	-	-	3,000
	System/3-4	2	$ 1,300	6/76	580	160	740	X
	System/3-6	2	$ 1,800	12/70	740	700	1,440	X
	System/3-8	2	$ 2,100	6/75	4,850	4,250	9,100	X
	System/3-10	2	$ 2,700	1/70	6,900	4,700	11,600	X
	System/3-12	3	$ 3,800	3/76	4,550	2,980	7,530	X
	System/3-15	3	$ 6,800	3/74	3,130	2,000	5,130	200
	S/3 Subtotal				20,750	14,790	35,540	8,200
	4331	3	$ 7,600	6/79	-	-	-	2,000
	4341	4	$ 18,900	11/79	-	-	-	2,000
	3031	6	$ 61,000	3/78	230	210	440	1,200
	3032	6	$114,000	3/78	100	90	190	350
	3033	7	$180,000	3/78	220	120	340	450
	370/115	3	$ 9,300	4/74	1,040	2,370	3,410	X
	370/125	4	$ 13,000	6/73	980	1,800	2,780	X
	370/135	4	$ 20,500	5/72	1,290	1,820	3,110	X
	370/138	4	$ 21,000	11/76	1,910	2,700	4,610	200
	370/145	5	$ 39,000	7/71	1,210	1,370	2,580	X
	370/148	5	$ 34,500	3/77	1,600	1,970	3,570	50
	370/155	6	$ 72,000	2/71	440	290	730	X
	370/158	6	$104,000	5/73	1,550	1,430	2,980	X
	370/165	7	$133,000	6/71	115	42	157	X
	370/168	7	$194,000	7/73	650	310	960	X
	370/195	7	$275,000	3/71	13	4	17	X
	370 Subtotal				11,348	14,526	25,874	6,250
	360/20	3	$ 2,900	12/65	900	1,680	2,580	X
	360/22	3	$ 3,700	7/71	76	90	166	X
	360/25	3	$ 8,300	10/68	76	340	416	X
	360/30	4	$ 11,200	6/65	1,560	800	2,360	X
	360/44	4	$ 18,700	7/66	42	37	79	X
	360/40	4	$ 19,000	6/65	1,050	740	1,790	X
	360/50	5	$ 33,500	8/65	495	240	735	X
	360/65	6	$ 70,000	11/65	390	135	525	X
	360/67	7	$140,000	6/66	16	7	23	X
	360/75	7	$122,000	1/66	25	11	36	X
	360/85	7	$183,000	10/69	1	1	2	X
	360/9X	7	$197,000	11/67	10	5	15	X
	360 Subtotal				4,641	4,086	8,727	X
	1130	2	$ 2,600	2/66	1,240	1,100	2,340	X
	1401	3	$ 3,700	9/60	500	415	915	X
	1401-G	2	$ 2,400	5/64	10	5	15	X
	1401-H	2	$ 1,750	6/67	5	-	5	X
	1410	4	$ 17,100	11/61	24	19	43	X
	1440	3	$ 4,700	4/63	56	78	134	X
	1460	4	$ 9,600	10/63	14	9	23	X
	1620	3	$ 2,700	9/60	94	82	176	X
	7010	5	$ 25,500	10/63	6	3	9	X
	7030	7	$160,000	5/61	1	-	1	X
	7040/44	5	$ 30,000	6/63	9	13	22	X
	7070/74	5	$ 27,000	3/60	62	9	71	X
	7080	6	$ 60,000	8/61	23	-	23	X
	7090/94	6	$ 71,000	8/60	25	8	33	X
	Subtotal				2,069	1,741	3,810	X
	Total				38,808	35,143	73,951	14,450
Itel	AS/3	4	$ 13,700	11/78	8	2	10	75
	AS/4	5	$ 23,000	6/77	70	20	90	100
	AS/5	6	$ 37,500	3/77	120	45	165	150
	AS/6	6	$ 57,500	5/78	30	10	40	60
	Total				228	77	305	385
Magnuson	M80/3	4	$ 6,200	/79	-	-	-	25
	M80/4	5	$ 10,000	12/78	6	-	6	50
	Total				6	-	6	75
NCR	8270	2	$ 1,700	11/79	-	-	-	100
	8350	2	$ 3,200	6/77	110	-	110	125
	8370	3	$ 5,500	7/78	10	-	10	50
	8410	2	$ 3,000	2/79	-	-	-	50
	8430	3	$ 4,800	6/78	10	-	10	30
	8450	3	$ 6,800	11/77	175	65	240	200
	8550	3	$ 11,700	4/76	310	235	545	80
	8560	4	$ 13,600	11/77	40	10	50	40
	8570	4	$ 17,400	5/76	65	75	140	60
	8580	5	$ 35,000	12/78	3	-	3	45
	8590	6	$ 50,000	9/79	-	-	-	5
	Century-50	2	$ 1,700	2/71	390	50	440	X
	Century-75	2	$ 2,200	7/76	75	-	75	X
	Century-100	3	$ 3,300	9/68	300	630	930	X
	Century-101	3	$ 4,100	10/72	860	670	1,530	X
	Century-151	3	$ 5,400	2/75	270	145	415	X
	Century-200	4	$ 7,600	9/69	200	335	535	X
	Century-201	4	$ 11,600	8/74	255	150	405	X
	Century-251	4	$ 20,500	11/73	60	72	132	X
	Century-300	5	$ 26,500	2/72	85	85	170	X
	315	3	$ 3,400	5/62	73	100	173	X
	315-EMC	4	$ 10,400	9/65	18	16	34	X
	Total				3,309	2,638	5,947	785
Singer	System 10	2	$ 2,700	10/70	1,400	1,200	2,600	X
Sperry-Univac	III	4	$ 27,000	8/62	80	28	108	X
	SS-80/90	3	$ 8,500	8/58	-	4	4	X
	418 I, II	4	$ 10,700	6/63	44	51	95	X
	418 III	4	$ 40,500	6/69	44	88	132	X
	491/492	5	$ 28,000	12/61	13	8	21	X
	494	6	$ 81,000	2/66	61	58	119	X
	1004	2	$ 1,100	2/63	240	200	440	X
	1005	2	$ 2,000	4/66	200	80	280	X
	1050	3	$ 9,000	9/63	120	36	156	X
	1106	6	$ 45,500	12/69	75	190	265	X
	1107	6	$ 60,000	10/62	4	8	12	X
	1108	7	$ 92,000	9/65	152	85	237	X
	1110	7	$145,000	6/72	58	73	131	X
	9200	2	$ 2,300	6/67	525	560	1,085	X
	9300	3	$ 5,000	9/67	410	410	820	X
	9400/80	4	$ 12,600	5/69	230	420	650	X
	90/25	3	$ 4,200	8/77	55	95	150	50
	90/30	3	$ 8,200	2/75	755	1,100	1,855	300
	90/40	4	$ 15,500	6/78	5	10	15	75
	90/60	4	$ 24,000	1/74	110	130	240	40
	90/70/9700	5	$ 29,000	8/72	17	40	57	5
	90/80	5	$ 64,000	12/76	30	15	45	25
	1100/10	5	$ 40,500	4/76	60	135	195	100
	1100/20	5	$ 55,000	4/75	16	38	54	5
	1100/40	6	$ 95,000	7/75	36	46	82	5
	1100/81/82	6	$112,000	3/77	36	37	73	60
	1100/83	7	$195,000	12/78	1	1	2	10
	1100/84	7	$238,000	11/78	1	-	1	5
	Subtotal				3,378	3,946	7,324	680
	301	4	$ 6,700	10/60	26	4	30	X
	501	5	$ 15,800	6/59	2	-	2	X
	3301	5	$ 23,500	7/64	41	-	41	X
	Spectra 70/15	3	$ 4,600	9/65	3	-	3	X
	Spectra 70/25	3	$ 7,800	9/65	-	7	7	X
	Spectra 70/35	4	$ 14,400	1/67	53	3	56	X
	Spectra 70/45	5	$ 27,000	11/65	150	6	156	X
	Spectra 70/46	5	$ 44,500	11/68	23	1	24	X
	Spectra 70/55	5	$ 41,500	11/68	5	-	5	X
	Spectra 70/60	6	$ 51,000	9/70	25	-	25	X
	Spectra 70/61	6	$ 55,000	3/71	4	-	4	X
	Spectra 1600	3	$ 4,300	1/69	35	-	35	X
	Spectra 70/2	4	$ 14,100	7/71	34	-	34	X
	Spectra 70/3	4	$ 23,500	10/71	15	-	15	X
	Spectra 70/6	6	$ 39,000	10/71	34	-	34	X
	Spectra 70/7	6	$ 48,000	10/71	18	-	18	X
	Subtotal				468	21	489	X
	Total				3,846	3,967	7,813	680
Xerox	Sigma 5	4	$ 14,600	8/67	121	21	142	X
	Sigma 6	4	$ 25,000	11/70	32	13	45	X
	Sigma 7	5	$ 29,000	12/66	58	9	67	X
	Sigma 8	4	$ 22,500	9/71	5	6	11	X
	Sigma 9	6	$ 57,000	11/71	76	30	106	X
	530	3	$ 4,200	8/73	101	37	138	X
	550/560	4	$ 14,500	11/74	29	5	34	X
	940	5	$ 26,000	4/66	36	3	39	X
	9300	3	$ 8,500	11/64	15	4	19	X
	Total				473	128	601	X
TOTAL					57,960	55,164	113,124	19,170

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SMALL BUSINESS COMPUTER CENSUS

The categorization of certain computers as "small business computers" is based on marketplace definitions as perceived by IDC. SBCs are those small general-purpose computers marketed by the major mainframers and their competitors to smaller businesses and first-time users. They include offerings from the major mainframers (such as IBM's System/32); products such as DEC's Datasystem/300 from the minimakers but aimed at commercial first-time users; equipment from firms (such as Qantel) that manufacture only SBCs; and products from companies that assemble systems from other's minicomputers as Basic/Four did before beginning its own manufacturing operations.

AS OF JANUARY 1, 1979

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ORDERS FOR 1979 INSTALLATION
Advanced Information Design	System 3000	Interdata X/16		24	39	3/75	41	0	41	NA
	System 4000	Interdata X/32		49		/78	NA	NA	NA	NA
Anderson-Jacobson, Inc.	1400	AJ 1400	a	16	22	1/70	260	15	275	X
	1520 Series	AJ 1500		19	21	7/77	140	20	160	45
	1560 Series	AJ 1500		30	35	7/77	40	0	40	45
Applied Data Communications	Event	Event		13	20	2/77	90	10	100	350
Applied Data Processing, Inc.	Resource 50	Nova-3/4		31	52	9/79	0	0	0	4
	Resource 100	Nova-3/12		41	72	6/76	14	0	14	6
Automated Business Concepts	Mesa Two	Nova-3		60	65	4/78	19	0	19	25
Ball Computer Products*	DASL	Nova-2/10		38	40	6/75	3	0	3	X
Basic/Four Corp.	200	BFC 1340		25	29	2/78	150	50	200	250
	350	BFC 1300, Microdata	b	34	34	9/71	500	576	1,076	X
	400	BFC 1300, Microdata	b	37	45	9/71	1,900	1,551	3,451	X
	410	BFC 1300		33	40	10/78	150	70	220	1,000
	500	BFC 1300, Microdata	b	39	50	7/72	100	82	182	X
	600	BFC 1300, Microdata	b	51	65	3/75	300	308	608	X
	610	BFC 1320		51	65	1/78	235	200	435	500
	700	BFC 1320		115	130	/77	115	93	208	X
	730	BFC 1350		110	125	6/78	65	55	120	260
	Total						3,515	2,985	6,500	
Binary Data Systems	UCOM-1	Nova-3, 4		40	60	11/75	48	0	48	X
	UCOM-2	Dual Nova-3		95	120	1/76	20	0	20	X
	UCOM-3	Eclipse S/130		120	170	6/76	6	0	6	15
	UCOM-4	Dual Eclipse S/130		200	285	5/77	20	0	20	20
BRD, Inc.	Dolphin			18	20	6/77	500	25	525	NA
	Porpoise			10	13	1/78				NA
BTI Computer Systems	4000/15	BTI 4020		36	40	1/76	341	8	349	X
	4000/25	BTI 4020		56	65	1/76	251	12	263	X
	5000	BTI 5030		39	44	9/78	190	2	192	1,100
Burroughs	B80	B80		20	35	11/75	2,000	2,500	4,500	2,500
	B700	B700		20	68	3/73	2,550	1,850	4,400	X
	B800	B800		32	53	5/77	1,000	700	1,700	2,000
	Total						5,550	5,050	10,600	
Business Controls Corp.	System 80	PDP-8/a		25	40	5/71	110	0	110	20
	System 80	PDP-11/23/34/60/70/VAX		40	80	6/75	70	5	75	45
Business Systems Products	Adviser	C. A. Syfa		42	50	7/76	100	0	100	200
Cado	Cado System 20	Intel 8080		14	16	4/76	730	270	1,000	
	Cado System 40	Intel 8080		18	20	8/76				1,100
	Cado System 20/4	Intel 8085		16	36	6/78	70	30	100	
	Cado System 40/4	Intel 8085		20	45	6/78				
Cascade Data, Inc.	80/20, 30, 40	Concept		28	43	1/70	50	0	50	X
	Concept II	Concept		27	35	6/75				
	Concept III	Concept		32	39	1/78	270	15	285	50
	Concept IV	Concept		17	19	4/78				
Century Computer Corp.	C-400	C-200, 400		34	45	3/75	185	35	220	NA
	C-700	C-200, 400		38	55	6/76	50	10	60	NA
	C-900	C-400		27	40	9/77	115	25	140	NA
	C-1000	C-400		40	50	6/77	20	0	20	NA
	Opus III	C-200		15	22	2/71	560	40	600	X
	Total						930	110	1,040	
Cincinnati Milacron	George 40	CIP/2200 B		16	20	2/77				NA
	George 60	CIP/2200 B		26	34	/76				NA
	George 70	CIP/2200 B		26	35	/76	630	150	780	NA
	George 80	CIP/4400		43	60	12/76				NA
	Other	CIP/2200 B		23	34	/74				NA
Clary Data Systems*	404	Clary		6	30	1/70	100	32	132	X
Complete Computer Systems	10, 11, 12	Nova-3/12		31	43	3/74	30	0	30	
	14, 16, 18	Nova-3/12		45	58	10/76	20	0	20	22
	20, 22, 24	Nova-3/12		58	74	9/77	12	0	12	
Compucorp	402	Compucorp 3000		13	15	1/76	15	455	470	X
	450	Compucorp 3000		20	22	4/76	40	115	155	X
Compudata	Series/1	IBM Series/1		26	33	10/77	30	10	40	50
Computer Hardware, Inc.	2120	CHI		15	50	5/75	10	0	10	X
	2130 C	CHI C		32	75	7/74	200	5	205	20
	2130 D	CHI D		44	120	1/78	3	0	3	5
	3230	CHI		15	50	6/76	25	0	25	25
	4210	CHI		13	13	9/77	4	0	4	5
	4250	CHI		37	45	6/78	7	0	7	10
	Total						249	5	254	
Computer Horizons Corp.*	CHI Distribution System	PDP-11/34, 70		30	200	10/76	9	0	9	X
Computer Interactions, Inc.	Compo II-8	PDP-8/e, f, m		40	55	11/72	211	0	211	20
	Compo II-11	PDP-11		40	55	6/75	129	0	129	85
	Word Pro II	PDP-8/a, Nova or H-P		13	19	2/77	145	0	145	200
Computer Systems Development, Inc.	Sentinel	8086		10		/79	0	0	0	100
Data General	CS/20	MicroNova		11	20	7/78	50	10	60	150
	CS/40	Nova-3/12		33	40	10/77	300	100	400	400
	CS/60	Eclipse		40	75	7/78	10	0	10	50
	Design Data EC300	Eclipse C/300	c	60	150	3/76	50	10	60	X
	Design Data N312	Nova-3/12	c	31	75	8/75	120	10	130	X
(Digital Computer Controls)	Synergist 1500	MicroNova	d	8	24	/76	15	0	15	30
	Synergist 1550	MicroNova	d	14	21	7/78	10	0	10	30
	Synergist 2500	Nova-3/12	d	27	40	/76	100	0	100	100
	Synergist 3700	Nova-3/D	d	40	60	/76	15	0	15	NA
	Total						670	130	800	
Decision Data Computer Corp.*	System/4	System/4		23	37	8/76	15	0	15	X
Diablo Systems, Inc.	3200	8080	e	19	23	1/77	400	250	650	NA
Digital Equipment Corp.	Datasystem 300	PDP-8, PDP-11		14	30	/72	5,300	2,200	7,500	2,500
	Datasystem 500	PDP-11		58	115	/72	900	700	1,600	600
Digital Systems Corp.	Galaxy/5	Galaxy/5		90	120	1/76	24	0	24	10
Dimis, Inc.	Total 100	Modcomp II		120	120	7/74	14	0	14	NA
	Total 100	Classic		205	205	1/79	5	0	5	NA
Display Data Corp.	Insight	Microdata 1600/30		38	59	1/74	440	10	450	500
	ELS System	Microdata 1600/30		27	33	5/78				125
DTC	TaskMaster	Intel 8080		17	19	9/78	15	50	65	500
Financial Computer Corp.	System III/5	System III		19	25	9/77	28	0	28	NA
	System III/8	System III		23	32	9/77	22	0	22	NA
	System III/10	System III		30	45	1/75	440	55	495	NA
Gemini Information Systems	Cispac/1	Series/1		48	66	4/78	15	0	15	15
	Cispac/16	Interdata X/16		48	65	4/76	34	0	34	10
	Cispac/32	Interdata X/32		86	110	8/76	17	0	17	10
General Automation, Inc.	DM-130/2	SPC-16/45		28	28	12/74	150	250	400	20
	DM-130	SPC-16/45		30	38	12/74	80	130	210	50
	DM-140	SPC-16/65		48	80	1/75	10	18	28	X
	440-DS	GA-16/440		38	70	1/76	25	60	85	100
	460-DS	GA-16/460		35	80	11/78	NA	NA	NA	NA
	Total						265	458	723	

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NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE ($1,000) BASIC	AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ORDERS FOR 1979 INSTALLATION
General Information Systems	GIS-350 ABLE	PDP-11/34		36	40	1/76	12	0	12	8
General Robotics Corp.	FD/X3	LSI-11		11	22	7/76	120	130	250	NA
	CD/X3	LSI-11		18	39	9/77	40	40	80	NA
GRI Computer Corp.	System 99	GRI 99/50		30	35	11/74	189	85	274	10
	System 99/E	GRI 99/52		43	50	11/77	7	3	10	40
Hewlett-Packard	HP 250	HP 250		24		/79	0	0	0	200
IBM	System/32	IBM S/32	f	33	42	3/75	13,300	6,000	19,300	X
	System/34	IBM S/34		35	50	12/77	9,000	3,500	12,500	16,000
	Total						22,300	9,500	31,800	
Infotecs	Imp	IM 6100		10	14	9/77	270	10	280	750
International Computing Co.*	System 95/99	Nova-2/10		24	35	10/72	9	0	9	X
Jacquard	J-100	NS IMP-16		12	41	8/75	250	150	400	NA
Keydata	Unity Series	Nova 3/4, 3/12, 3/D		48	80	4/79	0	0	0	55
Lockheed Electronics Co., Inc.	System III	Lockheed SUE		30	50	1/73	440	60	500	NA
Logical Machine Corp.	ADAM	ADAM		30	35	4/75	320	360	680	350
	TINA	TINA		18	20	12/78	21	19	40	550
Martin Wolfe, Inc*	Mesa Two 7000	DCC-116		54	81	12/71	140	0	140	X
	Mesa Two 4000	DCC-116		62	93	2/76	3	0	3	X
Microdata	Reality	Microdata 1600		32	60	12/73	2,000	400	2,400	NA
Microstar, Inc.	Microstar I	Zilog Z-80		13	17	12/78	5	0	5	150
	Microstar II	Zilog Z-80		14	19	12/78				
Mini-Computer Systems, Inc.	Micos 100	Nova-3/4		34	40	8/77	20	60	80	50
	Micos 200	Nova-3/12		40	60	/73	765	285	1,050	400
	Micos 300	Dual Nova-3/12		100	140	1/79	0	0	0	25
Minutemen Computer Corp.	1774	Nova-3/4		30	40	11/71	38	0	38	
	1775	Nova-3/12		32	44	3/72	18	0	18	40
	1776	Nova-3/12		35	59	3/72	26	0	26	
	1776/A	Nova-3/12		35	65	5/77	20	0	20	
Mylee Digital Sciences, Inc.	3000 Series	Mylee 3D		29	60	5/76	110	0	110	30
NCR Corp.	8130	NCR		20	24	3/78	275	325	600	800
	8150	NCR		29	38	12/77				
	8200	NCR		33	66	9/75				
	8230	NCR		29	53	6/77	2,200	3,000	5,200	2,500
	8250	NCR		42	60	12/76				
	Total						2,475	3,325	5,800	
Norfield Datasystems, Inc.*	Nova-System	Nova		35	50	6/73	20	0	20	X
Northrup Data Systems	BDS 500/700	Microdata 1600		30	50	3/77	30	0	30	
	BDS 1000	Microdata 1600		51	55	6/72	65	0	65	150
	BDS 2000	Microdata 1600		52	74	10/73	75	0	75	
	BDS 3000	Microdata 1600		125	135	4/79	0	0	0	
Pick & Associates	Evolution System	7764		65	77	11/73	104	12	116	115
	Evolution System	7787		88	97	10/77	18	2	20	35
Programmed Control Corp.	Prophet 21/1	TI 960-B		42	75	/72	35	0	35	NA
	Prophet 21/2	TI 990/10		57	100	1/78	11	1	12	NA
Q1 Corp.	Q1/LMC	8080		21	23	2/74	550	0	550	NA
	Q1/LITE	8800		21	26	2/77	350	250	600	NA
	Q1/MICROLITE	8800		12	17	1/79	0	0	0	500
Qantel	210	Q29		12	17	11/77	175	175	350	600
	800/900	Q7		28	29	5/75	93	71	164	X
	950	Q7		28	33	11/75	497	179	676	150
	960	Q7.5		30	35	11/76	58	34	92	150
	970	Q29B		36	40	1/79	0	0	0	250
	1200	Q7		42	59	11/75	213	23	236	X
	1300	Q7.5		42	59	11/75	44	18	62	X
	1400, -2	Q7.5		44	70	5/77	314	141	455	100
	1450, -2	Q29B		45	80	1/79	0	0	0	350
	Total						1,394	641	2,035	
Quodata Corp. (Educomp)	E-250, 500	PDP-8		15	30	/72				NA
	E-660,760,820,960	PDP-11		44	100	/75	237	21	258	NA
	QDP/78	PDP-8		10	10	/77				NA
	ECS/7800	PDP-8		10	11	/77				NA
Randal Data Systems	R-100 Series	Randal		14	17	10/75	245	10	255	125
	R-200 Series	Randal		24	30	10/76	352	0	352	240
	R-300 Series	Nova-2/10		34	45	6/74	27	0	27	X
	R-400 Series	Nova-2/10		36	45	6/74				X
	R-500 Series	Randal		42	47	10/77	40	0	40	35
	Total						664	10	674	
A. O. Smith*	Mesa Two	Nova-3		58	58	5/77	10	0	10	X
Span Management Systems*	TSS-2	IBM Series/1		31	31	/77	10	3	13	X
Sperry-Univac	BC-7	Univac		22	43	4/77	700	50	750	700
STC Systems, Inc.	Ultimacc-2000	Nova-3/12		34	80	9/72	98	2	100	10
	Ultimacc-3010	Nova-3/D		55	112	1/75	88	2	90	20
	Ultimacc-3080	Nova-3/D		84	143	11/75	15	0	15	10
Tri-Star, Inc.*	TTK-10	Nova-3/12		45	55	2/76	12	0	12	X
	TEK-80	Nova-3/12		52	67	4/76	4	0	4	X
Vanguard Computer Systems, Inc.	V400	Raytheon RDS 500		45	52	6/77	2	0	2	NA
	V500	Raytheon RDS 500		65	85	3/76	7	3	10	NA
Wang Laboratories, Inc.	2200	2200		10	19	4/73	11,260	7,410	18,670	4,000
	2200 VP	2200 VP		15	20	9/76	1,280	860	2,140	1,600
	2200 MVP	2200 MVP		18	27	1/78	360	300	660	1,000
	VS	2200 VS		47	75	10/77	210	110	320	500
	Total						13,110	8,680	21,790	
Warrex Computer Corp.	Centurion I-A	CC-205		18	19	/77	60	0	60	60
	Centurion II-A	CC-205		27	30	/75	95	0	95	70
	Centurion III	CC-205		36	36	/74	400	0	400	230
	Centurion V	CC-205		43	43	/75	85	0	85	70
	Centurion Series 100	CC-205		14	15	/79	0	0	0	30
	Centurion Series 200	CC-205		25	28	/79	0	0	0	40
	Total						640	0	640	
Wintex Computer Corp.	200 NS	Wintex		12	18	1/75	75	1	76	30
	MT 200	Wintex		10	20	/79	0	0	0	20
TOTAL							71,524	37,282	108,806	

Notes:

a) Includes installations of Eldorado 140
b) Used Microdata processors until 11/76
c) Design Data was acquired by Data General in February 1977
d) Digital Computer Controls was acquired by Data General in early 1977
e) Marketed in the U.S. by Shasta General Systems
f) U.S. installation figures account for retirements
*) Not currently active in manufacturing or marketing small business computers
NA) Data is not available
X) Model not in new production

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• THAT IBM TRIAL (REMEMBER?) COULD BE DELAYED "YEARS," says trial counsel Thomas Barr over a ruling by Judge David N. Edelstein that will require IBM to produce documents to back up testimony by Chairman Frank Cary. IBM contends that such mid-trial discovery, besides unearthing some highly sensitive information, could cost $1 billion and take 62,000 man-years to collect. The defendant argues that a long delay of the trial will be necessary . . . to which, of course, the Department of Justice, objects. The case, begun in 1969, went to trial in 1975.

• SPEAKING OF TRIALS, THE TRAIL ENDS FOR CALCOMP . . . since the Ninth Circuit Court of Appeals has upheld a lower court decision against Calcomp in the company's $300 million antitrust suit against IBM. The court said it found no substantial evidence that any of IBM's acts were unreasonable.

• MA BELL MAY YET GET TO PLAY HARDBALL IN THE EDP BUSINESS, depending on the final results of the Computer Inquiry II. "Tentative" results have the FCC redefining the hybrid EDP-Communications market into 5 categories: 1) voice ervices, 2) nonvoice services, 3) "enhanced" nonvoice services, 4) simple station equipment, and 5) sophisticated equipment. AT&T would be allowed to compete, if the "tentative" ruling is accepted, in the controversial areas (3 and 5) by means of arm's length subsidiaries. Tariffs would be optional . . . which would presumably allow the regulated carrier to bypass the constrictions of a 1956 consent and decree barring it from unregulated businesses.

• ACTIVITY IN BUBBLE MEMORY CONTINES TO BURBLE as Rockwell signs pacts with both Burroughs and Siemens concerning the avant garde memory technology. In the first, Rockwell will exchange information and assistance with Burroughs; in the second it signed a second-source agreement. Over a period of five years, Rockwell and Siemens will also exchange certain future products.

• BUT THAT DOESN'T MEAN DISK IS DEAD . . . why, just recently Memorex announced a double-density version of its 3350 equivalent, the 3650. The new model, the 3652, is a dual-spindle system with 635 MB per spindle. Thus, one module supports 1.2 gigabytes; and a standard configuration includes four modules ($191,000) . . . with a resultant cost of .004 cents/byte.

• PUT YOUR NAME IN THE 4300 HOPPER? GOOD LUCK. IBM has announced the delivery schedules and they are long (IDC has a 3-year wait). Multiple orders have been spread out, too, especially affecting leasing companies.

• FROM THE PCM-CPU FIRMS: THERE IS LIFE AFTER THE 4300 . . .although until IBM announced its delivery dates for the E-series on June 18 there was a lot of uncertainty. Itel, for instance, had to realign its computer operations in the face of first half losses, but now the company says it sees renewed activity. (Itel is pushing short-term leases and prepping for two new models to take advantage of long 4300 lead times.)

Amdahl, which expects a break-even 2Q, says it is still in there kicking, albeit with a higher lease/purchase ratio than it might have hoped. Blood relative Magnuson Systems, on the other hand, is almost ebullient . . . having capped a $10 million private funding deal on the day of the IBM announcement and joined in a marketing program with Boothe Computer Corp.. National Semiconductor, however, has withdrawn its System/400 from the market to rework it into a less expensive system.

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DESKTOP COMPUTER CENSUS

The Desktop Computer Census counts those computers which typically are small enough to be used on a desktop, and are found in a variety of end-user environments including business, home, hobby, personal, educational, and scientific. By IDC definition the Desktop Computer is microprocessor based, includes its own power supply and enclosure, has the capability for attaching output peripherals -- video screen and/or printer -- and can also attach storage devices such as floppy diskettes, tape cassettes, or in some cases fixed disks. The computer is programmable in BASIC or equivalent level language, and costs from less than $1,000 up to $15,000 in a basic configuration. Microcomputer boards and kits are not counted here.

AS OF JANUARY 1, 1979

MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	PURCHASE PRICE IN DOLLARS BASIC	PURCHASE PRICE IN DOLLARS AVERAGE	DATE OF FIRST INSTALLATION	IN U.S.	OUTSIDE U.S.	WORLD TOTAL	ESTIMATED 1979 INSTALLATIONS
Apple Computer Co.	Apple II	6502	1,195	2,500	5/77	14,000	4,000	18,000	45,000
Atari	400	6502	550	550	9/79	-	-	-	) 1,000
	800	6502	1,000	1,000	9/79	-	-	-	)
Compal	8100	8080	9,775	12,000	10/76	400	-	400	200
	8200	Z80	11,995	14,000	11/79	-	-	-	30
Commodore Business Machines	Pet	6502	595	795	10/77	34,000	13,000	47,000	80,000
Compucorp	625	Z80	7,000	10,000	9/77	200	600	800	200
	655	Z80	5,400	8,500	5/79	-	-	-	150
	665	Z80	6,700	10,500	5/79	-	-	-	450
Computer Data Systems	Versatile 4	8085	3,800	4,500	11/77	400	75	475	600
	Versatie 3B	8085	4,900	5,500	11/77	150	25	175	300
Cromemco	System Three	Z80A	8,080	12,000	8/77	1,400	100	1,500	3,000
Digital Microsystems	DSC-2	Z80A	4,995	5,895	11/77	400	50	450	1,000
	DSC-2 SBS	Z80A	9,950	9,950	6/78	50	-	50	500
	DSC-86	8086	5,995		/79	-	-	-	100
	DSC-86 SBS	8086	12,950		/79	-	-	-	100
Durango Systems	F85	8085A	12,983	13,517	10/78	15	-	15	1,000
Dynabyte	DB8/1	Z80	2,295	6,000	/78	45	30	75	370
	DB8/2	Z80	4,395	7,000	/78	30	10	40	180
Exidy	Sorcerer	Z80	995	2,200	8/78	1,000	1,000	2,000	10,000
General Robotics	Polaris	LSI-11	13,000	13,000	4/78	-	100	100	200
Heath	WH89	Z80	2,295	2,500	/79	-	-	-	1,000
Hewlett-Packard	9825	HP	5,900	11,000	1/76	17,000	23,000	40,000	)
	9835	HP	9,000	13,000	12/78	50	50	100	) 25,000
	9845	HP	12,000	28,000	11/77	2,000	3,000	5,000	)
IMSAI	VDP-40	8085	5,300	5,300	/78	190	10	200	200
	VDP-80	8085	7,800	7,800	/77	500	100	600	200
Industrial Microsystems	5000	8080, Z80	3,300	3,300	6/79	-	-	-	400
	8000	8080, Z80	4,700	4,700	6/79	-	-	-	400
Intelligent Systems	8051	8080A	3,650	4,200	/76	2,100	900	3,000	) 2,000
	3621	8080A	3,300	3,300	7/79	-	-	-	)
	Compucolor 2	8080A	1,600	1,800	9/78	600	-	600	4,500
Interactive Computer Systems	MCM 900	2901	9,200	20,000	2/79	-	-	-	200
	MCM 800	Bipolar	8,600	17,000	1/77	100	120	220	25
	MCM 700	8008	7,200	12,000	3/75	50	100	150	-
IBM Corporation	5100	IBM	6,300	13,000	11/75	4,300	1,000	5,300	100
	5110	IBM	9,900	17,000	2/78	6,000	700	6,700	9,000
Micro V Corporation	Microstar I	8085A	7,500	15,000	8/78	25	25	50	500
Midwest Scientific	MSI-6800AW	6800	3,895	3,895	5/79	-	-	-	100
North Star Computers	Horizon	Z80A	2,315	2,765	12/77	2,500	450	2,950	6,000
Northwest Microcomputers	NMS 85/P	8085	8,500	8,500	1/78	5	25	30	NA
Odell Industries	System 85	8085A	10,450	15,500	6/78	30	-	30	NA
Ohio Scientific	Challenger	6502/6800/ Z80	1,260	2,500	/78	500	-	500	1,500
Pertec Computer Corporation	PCC2000	8085A	9,995	13,120	9/78	70	20	90	1,500
	MITS 300/25/55	8080	8,080	13,800	/77	1,050	150	1,200	100
Polymorphic Systems	8813	8080	4,375	5,800	9/77	1,500	200	1,700	900
Processor Technology	Sol I/II/III/IV	8080A	3,000	6,000	/77	3,600	400	4,000	1,000
R2E of America	80/30	Z80	5,000	7,000	7/79	-	-	-	20
(U.S. Only)	80/40	8080	7,000	8,500	7/76	20	-	20	50
	80/50	8080	12,000	15,000	7/75	5	-	5	20
Smoke Signal Broadcasting	Chieftan	6800	2,595	3,000	3/79	-	-	-	500
Solid State Technology	Athena 8285	8085A	8,000	10,000	/79	-	-	-	450
Space Byte Computer	DBM/1	8085	5,900	12,500	7/78	55	10	65	65
	DBM/2	Z80	5,900	12,500	6/79	-	-	-	125
Tandy Radio Shack	TRS-80/I	Z80	499	1,000	9/77	63,000	7,000	70,000	105,000
	TRS-80/II	Z80	3,450	5,000	7/79	-	-	-	5,000
Tano Corporation	Outpost 11	6800	2,595	3,500	8/78	75	-	75	600
	Outpost 7	6800	3,000	4,000	8/77	180	20	200	50
Tektronix	4051	6800	5,995	17,000	12/75	5,000	2,500	7,500	4,000
Texas Instruments	99/4	TI9900	1,150	1,300	/79	-	-	-	6,000
Vector Graphic	System B	Z80	4,750		1/79	-	-	-	) 3,500
	Memowrite	Z80	8,950		1/79	-	-	-	)
Wang Laboratories	PCS1	Wang 2200	5,400	8,000	4/76	800	300	1,100	-
	PCS2	Wang 2200	4,800	10,000	4/77	2,000	1,300	3,300	2,200
TOTAL						165,395	60,370	225,765	

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REVIEW & FORECAST

EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MAY 19, 1978 • VOL.13,NO.~~20~~21+22 P.J.McGOVERN, PUB.

A very elastic market

COMPUTER SHIPMENTS JUMP 20%; SIMILAR GROWTH EXPECTED THIS YEAR

No matter how you measure it, 1977 turned out to be a very good computeryear indeed. And 1978 is stacking up to be equally good . . . perhaps better.

As anticipated (EDP/IR Apr.22,1977), total shipments of computers by U.S.-based manufacturers were up 20% in 1977 to $15.7 billion -- and an increase to the $18.7-billion level for this year is forecast by IDC. Revenues to services companies totaled almost $6 billion; the installed base of data entry/communications equipment reached $11.5 billion; minicomputer shipments, part of the total, zoomed almost 45% to over $2.3 billion; and the small business computer market came into its own as shipments increased 40% to the $1.2-billion level.

But the year 1977 -- filled with product announcements ranging in size from IBM's 3033 to microprocessors -- will probably be best remembered for its verification of the elasticity of the marketplace and the coming of age of the so-called plug-compatible mainframe sector. Here are specific highlights of 1977:

- IBM introduced the 303X processors and cut System/370 prices; others beefed up large system offerings and boosted price/performance of midrange systems. Large systems efforts ranged from a paper tiger -- HIS' 66/85 -- to new technology in Burroughs' latest 6800s.

- Superminis were given more software by their manufacturers as well as some from independents while micro-based systems increasingly began to erode some markets long the bastion of plain-vanilla minis. Again, software remained the key element in the marketing fight.

- Distributed processing, still a buzzword, neared reality as several vendors brought out their own internal communications schemes.

- Software in general emerged as the key to performance for hardware. And, more and more vendors are electing to improve their systems' performance through microcode.

- The debate over regulation vs. deregulation -- plus confusion about what separates data processing from communications and vice versa -- continues among the major marketplace forces.

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- Litigation did not take any holiday. IBM began its defense in the U.S. antitrust trial (EDP/IR May 6,1978) and is learning the hard way that directed verticts can come back to haunt, as in the Greyhound case. The Calcomp case, in which IBM also received a directed verdict, is in the appeals process; the Memorex case is nearing completion of its first round.

What's more, the year just past marks a distinct shift in the computer users' environment. After several years of business-oriented, budget-conscious management -- that resulted in relatively flat computer shipments -- data processing departments again are centers for action. Several forces are expanding budgets:

- Money can again be spent to increase the level of service rather than strictly allocated to cost-justified projects;

- Distributed processing, often the most economical way to provide service -- taps budgets throughout an organization;

- Availability of the new price-performance mainframes is stimulating new applications development rather than reducing hardware budgets.

All in all, a period of accelerated spending for hardware and services seems to lie ahead. This spells good times for the computer industry, and the IDC forecasts in this issue reflect this outlook.

WORLDWIDE GENERAL-PURPOSE COMPUTER MARKET FOR U.S.-BASED MANUFACTURERS
(Copyright 1978 by International Data Corporation)

	1977 Shipments		In Use Yearend 1977:		
	$M	% Total	$B	% Total	1976-77 Change
IBM	$8,275	67.5%			
PC Periph.	525	4.3			
Amdahl	190	1.6			
Itel	75	.6			
IBM Systems	$9,065	74.0%	$55.0	71.7%	+ 14.0%
Burroughs	835	6.8	4.4	5.8	+ 16.0
HIS + Xerox	765+	6.3	6.3*	8.2	+ 7.3
Sperry Univac	750	6.1	5.8	7.5	+ 8.2
Control Data	345	2.8	2.6	3.4	+ 9.5
NCR	335	2.7	1.8	2.3	+ 13.8
DEC	135=	1.1	.6	.7	+ 26.8
Singer	0	0	.3	.4	- 1.2
Cray	20	.2	-	-	-
SUBTOTAL	$3,185	26.0%	$21.8	28.3%	+ 10.4
TOTAL	$12,250	100.0%	$76.8	100.0%	+ 12.9%

*Includes equipment manufactured by Xerox
+Does not include $130 million in minicomputer revenues
=Does not include $1,100 million in minicomputer revenues

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Mainframes -- more for less

As mentioned above, mainframe (and peripheral) manufacturers tested the elasticity of the marketplace . . . and found it there. Lower prices and higher performance ratings can mean greater revenues through increased volumes. Prior to 1977 there were industry observers who suggested such price/performance improvements would decrease shipment volumes (or at least slow increases); today, proponents of such theories are back at their drawing boards. More bang for the buck still means more bucks.

As a result, IDC's forecast of average value of general-purpose shipments -- a convenient ratio to look at in examining longer-term developments --will continue to climb through 1982. In the face of higher performances, users are adding more "goodies" to systems -- more memory, disks, and/or communications capabilities -- and thus raising the final pricetag.

In providing more price/performance, mainframers both adjusted prices and introduced improved products. One favored area (though not chosen by IBM) was to utilize higher density semiconductor memories -- up to 16K-bit chips in the case of Burroughs and Univac. On the price side, IBM collapsed its umbrella, but other mainframers said their margins would not be adversely affected . . . and all turned in strong financial performances for the year. Here's a rundown:

Burroughs, as usual, did its technology homework; it put charge-coupled devices (CCDs) in the file memory of its scientific processor, a specialized CPU that performs parallel processing. And, again illustrating probable future computer architecture, it brought out the Attached Fortran Processor. Burroughs new top-of-the-line 7800 consists of four dedicated processing units per system, and up to eight processor systems, either CPU or I/O, can be linked together. At the small end, the B800 is designed to be a more powerful replacement for the B700 series. One model, the B820, combines bipolar and MOS memory to expedite processing. Smaller and larger B80s were also introduced. Other equipment introduced during the last year includes Burroughs' Dexnet, which can link other facsimile units with its high-speed 5100 that receives and sends a page of text in 20 sec.

Control Data spent the year firming up its positions in services, which account for 20% of its computer-related revenues, in addition to minding the shop for its OEM equipment and mainframe line. Perhaps the most notable expansion (or new activity) has come from CDC's peripherals division, which is marketing the IBM plug compatible Omega system designed by IPL Systems Inc. For its own computer base, CDC framed its Cyber line, adding the entry level 171 and the top-of-the-line 176. During the year it also lowered the cost and configuration of a minimum 176 while adding three models to the Cyber 175 line. And, to keep its super-large system customers happy, CDC added a medium-scale preprocessor called the MP 32. In what is possibly a pace-setting move, the firm -- an early pioneer of separately pricing software in a significant manner -- began transaction pricing of selected application software.

On other fronts of this diversified computer industry firm, CDC established a special OEM division to develop and market terminals and peripherals for use on IBM's Series 1 minicomputer. For the education market it has been wooing, CDC announced a third price cut for the reactive Plato terminal, bringing its cost down to one half what it was originally. Also, during the year, CDC didn't let any cobwebs grow on its reputation for cooperative ventures with foreign firms and/or governments, and it continued to criticize the U.S. policy (or lack thereof) on the export of DP systems.

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Honeywell continued its emphasis on distributed processing, adding a raft of Level/6 minicomputers that operate with its Distributed Systems Environment, the Honeywell terminology for its latest approach to the large systems area. HIS also beefed up its small-scale Level 62, targeting the System/3 market that is apparently being overlooked by IBM. In the area of larger machines, it introduced and then replaced the Level 64 models 30, 50, and 60, made in France, with one modular version of the Level 64. And at the large end, HIS announced (then later killed) plans for a top-of-the-line 66/85. To fill in, the company dressed up the 66/60 and 66/80 -- calling them the 66 and 68 Distributed Processing System while chopping their prices to put them more in line with the current IBM prices. On other fronts, Honeywell expanded its interest in terminals, broadening its own product line and acquiring Incoterm, thus establishing a foothold into the world of banking and other industries with specific terminal needs. The company was among the first to unveil a high-speed non-impact printer, the Page Printing System.

NCR expanded its Criterion line with models 8560, 8580, and 8590 . . . and hinted that the line will grow to include an 8600. In the medium range, it announced the 8400, based on Criterion architecture, and the 8300, based on Century architecture. And at the small end, NCR unveiled its I-8100 series, including an 8130 and 8150, and added the 8250 to the line of multiprogramming 8200s. For its 499 electronic accounting machine users, NCR brought out a number of specific applications such as one for county road systems. NCR solidified its already firm position in the POS arena with an upgradeable 2140 that can start as a free-standing electronic cash register and, with the addition of a circuit board, become a POS terminal when necessary. And to firm up the very low end of the retail line, NCR added a 2115 electronic cash register.

Sperry Univac spent the year filling out its line of 1100 and 90 series computers (plans for an actual "bridge" line between the two families were dropped) and peddling the BC/7 small business computer to first-time users. New members of the 90 series range from the 90/25 to the 90/40 and the 90/80-2 and -3. The 1100/80, 83, and 84 were added, also. From a hardware standpoint, the 1100/83 and 84 as well as the 90/40 incorporate 16K-bit memory chips for main memory. In addition, Univac has made a stronger bid for IBM converts, offering a system that lets IBM programs run unmodified on the 90/80 while the user converts to the VS9 operating system. The low-end, turnkey BC/7 system grew to three models later in the year; the low end uses diskettes rather than the cartridge disk of the original model. Up until now, Univac has kept its Varian minis as a separate product line and reported that the operation contributed about $35 million in revenues for calendar 1977.

Enter: Compatible Mainframes

The concept of the IBM-compatible mainframe came of age last year. Proving they were a force to be reckoned with and not just a passing fancy, the plug-compatible mainframe manufacturers (PCMMs) shipped more of what IDC calls Size Class 7 (168 and above) computers than did all the other non-IBM mainframers. And for 1978, IDC estimates are that the PCMMs will ship well over twice as many machines (distributed throughout Size Classes 5, 6, and 7) as the 80 shipped in 1977. If PCMM activity continues at its current pace, IDC estimates show that processors from these companies could account for some 20% of IBM's installed base by 1980 303Xs plus 370/148s and above.

And this market is large. During the four-year period 1977-1980, IDC estimates that IBM and the PCMMs will ship some 9,000 or more of these systems world-

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wide. Competitors for this business, to date, include Amdahl, the company that started it all, Itel with processors from Hitachi as well as National Semiconductor, Control Data with the Omega, and Magnuson Systems. Other companies with new breeds of superminis may take cracks at portions of the market, as well.

The big question: How long will IBM let its operating system be in the public domain and therefore assessible to the PCMMs? The answer is not simple, and naturally depends on what IBM is planning.

It seems clear to EDP/IR that IBM's eventual direction will be toward memory-oriented hardware, surrounded by both general- and special-purpose processors. Indeed, one possible step in this direction would be announcement of a new data base operating system combined with new hardware (a new memory technology) that could be shared with several 303X processors.

Meanwhile, IBM has the option and in fact is headed toward separately pricing more of its software. So-called selectable units have established the precedent of pricing portions of the operating system separately; and, of course, special packages, including some fairly complex ones, have been charged for separately for some time. And any move that shifts the total customer payment from hardware to software also affects margins for the PCMMs, which would have to make allowances for their customers to acquire the IBM offering.

Furthermore -- through its use of microcode on the 303X and its MVS Systems Extension -- IBM has already staked out areas that could affect PCMM compatibility. (Internally, EDP/IR understands, IBM talks of systems that are represented as being compatible!) Gradually, the scenario goes, IBM users would follow a path -- paved with microcode and unbundled software -- so far that PCMM offerings are no longer as compatible as they are today. In the future, it seems to EDP/IR some of these competitors will be more compatible than others.

The peripheral picture

One development expected -- if not overdue -- from IBM is a new high-capacity disk with advanced features . . . perhaps ones that can be activitated only via microcode available only on selected mainframes. At first glance this technique would seem reminiscent of the 2314A, 2319, and integrated controllers that still are the focal point of IBM's antitrust clashes with the peripherals companies. But if enough new technology were involved, this approach could be clouded.

The market is ripe. Demand appears to be nearly as insatiable as that for mainframes and main memory, and IBM is expected to enhance its fixed media (3350) drives with at least double current capacities. This would erode the 3330 base and impact all manufacturers of that technology.

Two other products are expected from IBM, probably within the next year. A new, smaller mass storage system -- probably based on 3850 technology -- would open a broader group of users -- including medium-scale users as well as those large-scale users still resisting mass storage -- to the tape-replacement marketplace the 3850 and similar products have pioneered.

And a new tape drive replacement subsystem -- whether half inch or based on the cartridge that is part of the 3850 mass storage system -- would truly offer a new area for activity. Total demand for tape use would not likely be expanded, but such a method of storing more for less would obviously open user pocketbooks.

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The processor picture

The review and forecast tables in this issue -- pages 9-12 -- are consistent with IDC's definitions and its division of processors into three basic varieties, which are illustrated by the three Census tables at the rear of this issue:

- General-purpose systems essentially are those made by (or compatible with) the major manufacturers discussed earlier in this issue and that don't fall into one of the two following categories.

- Minicomputers are used as tools, not solutions, and tend to be marketed in quantities greater than one. They often are supplied to other original equipment manufacturers (OEMs) and may end up as parts of a data entry system, a lab instrument, a piece of control equipment, or a small business computer.

- Small business computers are produced by the general-purpose manufacturers; an additional group of independents; or by minimakers and those that build systems from minis. To the extent this is the case, there is double counting between mini- and small business computers and this overlap has been removed from the summary table on page 9.

Minicomputers: A changing role

Minicomputers are rapidly becoming significant in the value of total shipments of all computers, as the tables illustrate. Long thought of as simply a low-cost, high-volume item, the minicomputer by 1982 will be responsible for nearly 30% of the $30.7 billion value of worldwide shipments of all computers by U.S.-based makers. In 1977, that figure was about 15% of $15.7 billion.

In terms of computers installed, the value of minicomputers will grow 4.7 times between 1977 and 1982 whereas the value of the total base will merely double. Value of yearly shipments will increase accordingly -- minis almost quadrupling while the total nearly doubles. Mini shipments in 1977 were up almost 45% to the $2.3 billion level, exceeding last year's forecast. And by 1982, IDC now forecasts that worldwide mini shipments by U.S.-based manufacturers will top the $9 billion level.

Several interesting trends are underway in the mini area, and are included in the forecasts. Among them:

- The classification of minis is blurred on the low end -- where micro-versions of traditional minicomputers compete with purely personal computers and the small business computers -- and at the high end -- where superminis are being given IBM-compatible software and aimed at the general-purpose market.

- Minis, once best known for their use in problem solving and lab-oriented or computational applications, today are being applied more and more to commercial DP applications. As distrubuted processing and autotransaction continue to develop, such end-user-oriented shipments will account for about half the mini market by the early 1980s.

- Not coincidentally (with superminis and business applications on the rise), the minimakers are finding themselves forced to act more like

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WORLDWIDE MINICOMPUTER MARKET -- 1977 ACTIVITY
(Estimates of Units Shipped and $ Million Revenues; Copyright 1978 by IDC)

Company	Revenues	% Total	76-77 Growth	Units	% Total
Digital Equip.*	$1,100	41%	55%	37,500	43%
Hewlett-Packard*	390	14	28	4,800	5
Data General	279	10	42	10,900+	12
Honeywell	130	5	16	1,600	2
Perkin-Elmer***	86	3	56	1,500	2
General Automation	84	3	12	2,500	3
Texas Instruments	80	3	78	5,000	6
IBM	70	3	--	1,300	2
ModComp	54	2	46	703	1
Computer Automation	52	2	53	5,057	6
Prime	50	2	117	626	1
Univac/Varian	42	2	0	1,200	1
Control Data	36	1	13	330	neg.
Microdata*	38	1	6	996	1
SEL**	35	1	52	150	neg.
Harris	32	1	60	235	neg.
Lockheed	25	1	9	1,579	2
Cincinnati Milacron	18	1	64	1,240	1
Others	99	4	14	10,784	12
TOTAL	$2,700	100%	44%	88,000	100%

*Including terminal & peripheral shipments +Excludes board-only computers
**Excluding older process control systems ***Including terminals; ex-Wanco

computer companies -- supplying full systems and devoting increasing amounts of resources to software development.

Because of such developments, the minicomputer market segment finally seems to be merging into the computer industry mainstream, at least at the upper end. At the lower end, the products more and more will compete with home/hobby market offerings or the computer-on-a-chip components that are becoming available from the semiconductor manufacturers. It's almost as if the minicomputer is disappearing as an entity.

The emerging small business computer

It wasn't until early 1975, when IBM announced System/32, that small business computers existed as a marketplace phenomenum, even though products for the market had been around. The significance of S/32 has been its positioning as a programmerless device . . . truly solution oriented. The wide acceptance of this machine (over 20,000 installed at yearend 1977) defined a significant and distinct new marketplace. U.S. suppliers have installed almost 70,000 computers valued at $2.8 billion. In five years, according to IDC forecasts, these figures will reach nearly 400,000 installed worth over $15 billion at original shipment value. The marketplaceplace shaped up as follows at yearend 1977:

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IBM	20,310	units	worldwide	worth	$853	million	= 30.2%
Burroughs	6,320	"	"	"	359	"	12.7
NCR	3,155	"	"	"	200	"	7.0
Sperry Univac	400	"	"	"	18	"	0.6
Digital Equipment	7,036	"	"	"	293	"	10.4
Data General	1,730	"	"	"	129	"	4.6
Other Mini Firms	3,738	"	"	"	191	"	6.8
Wang	15,270	"	"	"	307	"	10.8
Basic/Four	4,622	"	"	"	217	"	7.7
Other Independents	7,317	"	"	"	260	"	9.2
TOTAL	69,898				$2,827		100.0%

The figures for the minicomputer manufacturers include minis shipped to systems houses and reconfigured as small business computers.

Services: The big new factor

Quietly over the past few years, the computer services market has developed into a $4 billion industry that will more than double again during the next five years . . . and the software sector is poised to become the industry's next billion dollar sector. For perspective, users in the U.S. spend about half as much on software and services as they do on hardware . . . and about one-third as much as for salaries. Savings in salary dollars, in fact, has been one of the prime moving factors behind the shift to computer services and outside software.

Eight major vendors paced the market in 1977 with more than $100 million in revenues each. These range from Control Data with more than $300 million of its sales from services through more specialized firms. Computer Sciences generated $263 million in software and services revenues, ADP was at the same level in 1977 and is pioneering the move into including computers along with service offerings. The others are EDS, GE's ISBD, SDC, Tymshare, and McAuto. Large user organizations -- banks, oil and insurance companies -- are moving into services. And the biggest unknown is IBM. It obviously will create markets as it spearate software costs from hardware in competing with PCMMers. Observers ask if it will enter the services fray after 1979 when legal restrictions are removed.

REVENUES OF COMPUTER SERVICES AND SOFTWARE COMPANIES
(Copyright 1978 by International Data Corporation)

Product	1977	Growth/Year	1982
Processing Services	$4,185M	17%	$ 9,000M
Packaged Software	500	28	1,685
Custom Software & Consulting	605	8	900
Facilities Management	575	13	1,050
TOTAL	$5,865	17%	$12,635

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COMPUTER MARKET SUMMARY -- (U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	67,350	253,700	$ 11,880	$ 58.8
1975	75,200	315,900	12,040	67.2
1976	96,340	388,890	13,070	76.3
1977	133,280	496,620	15,680	88.2
1978	168,450	640,910	18,730	101.9
1979	210,600	825,200	21,020	117.3
1980	262,800	1,055,550	23,720	134.9
1981	328,550	1,346,600	27,140	155.0
1982	405,950	1,709,550	30,680	178.1
		UNITED STATES		
1974	46,100	167,100	$ 7,000	$ 33.6
1975	50,600	207,100	6,460	37.9
1976	64,840	255,540	6,870	43.0
1977	88,960	325,000	8,730	49.7
1978	112,000	416,200	10,610	57.5
1979	140,300	532,650	11,970	66.2
1980	174,100	677,400	13,570	76.3
1981	216,050	858,800	15,550	87.8
1982	266,650	1,084,850	17,560	101.0
		INTERNATIONAL		
1974	21,250	86,600	$ 4,880	$ 25.2
1975	24,600	108,800	5,580	29.3
1976	31,500	133,350	6,200	33.3
1977	44,320	171,620	6,950	38.5
1978	56,450	224,710	8,120	44.4
1979	70,300	292,550	9,050	51.1
1980	88,700	378,150	10,150	58.6
1981	112,500	487,800	11,590	67.2
1982	139,300	624,700	13,120	77.1

This is the total of all general-purpose computers, minis, small business computers (SBCs), and "other" systems such as IBM's S/7. Minis used in SBCs are subtracted from the total to eliminate double counting. Details on the three major types of computers are found in tables elsewhere in this issue. Note that the general-purpose and SBC tables are mutually exclusive, but the minicomputer table includes computers subsequently shipped to users -- by the minimakers themselves or by systems houses -- as small business computers.

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GENERAL-PURPOSE COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	16,000	111,300	$ 10,700	$ 54.2
1975	13,800	115,400	10,410	61.1
1976	14,300	111,700	10,630	68.0
1977	17,500	111,300	12,250	76.8
1978	17,000	116,200	14,100	86.2
1979	16,100	121,400	14,900	96.0
1980	17,000	127,100	15,800	106.4
1981	17,900	132,100	17,000	117.2
1982	17,900	136,700	18,000	128.6
		UNITED STATES		
1974	8,600	61,500	$ 6,200	$ 30.2
1975	6,700	62,100	5,410	33.6
1976	7,100	59,500	5,330	37.4
1977	8,900	58,100	6,460	42.1
1978	8,800	59,700	7,500	47.1
1979	8,300	61,400	7,900	52.2
1980	8,800	63,600	8,400	57.7
1981	9,300	65,500	9,000	63.4
1982	9,300	67,200	9,500	69.4
		INTERNATIONAL		
1974	7,400	49,800	$ 4,500	$ 24.0
1975	7,100	53,300	5,000	27.5
1976	7,200	52,200	5,300	30.6
1977	8,600	53,200	5,790	34.7
1978	8,200	56,500	6,600	39.1
1979	7,800	60,000	7,000	43.8
1980	8,200	63,500	7,400	48.7
1981	8,600	66,600	8,000	53.8
1982	8,600	69,500	8,500	59.2

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MINICOMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	47,500	121,500	$ 940	$ 2.7
1975	51,900	171,000	1,185	3.8
1976	63,800	230,400	1,600	5.3
1977	88,000	311,700	2,315	7.4
1978	116,200	418,300	3,195	10.3
1979	150,000	556,300	4,265	14.3
1980	190,000	730,300	5,600	19.5
1981	240,000	952,400	7,235	26.3
1982	300,000	1,231,100	9,135	34.8
		UNITED STATES		
1974	34,700	89,700	$ 630	$ 2.0
1975	36,900	122,800	735	2.6
1976	45,900	162,700	1,025	3.5
1977	61,600	215,800	1,550	4.8
1978	80,200	284,100	2,170	6.7
1979	103,500	372,600	2,855	9.3
1980	129,200	482,400	3,640	12.5
1981	160,800	620,400	4,630	16.7
1982	200,000	792,900	5,755	21.8
		INTERNATIONAL		
1974	12,800	31,800	$ 310	$ .7
1975	15,000	48,200	450	1.2
1976	17,900	67,700	575	1.8
1977	26,400	95,900	765	2.6
1978	36,000	134,200	1,025	3.6
1979	46,500	183,700	1,410	5.0
1980	60,800	247,900	1,960	7.0
1981	79,200	332,000	2,605	9.6
1982	100,000	438,200	3,380	13.0

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SMALL BUSINESS COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	4,150	6,200	$ 200	$ .3
1975	10,600	16,800	400	.7
1976	21,600	38,400	870	1.6
1977	31,500	69,900	1,220	2.8
1978	39,950	107,900	1,590	4.3
1979	50,200	155,000	2,050	6.2
1980	63,100	213,000	2,580	8.5
1981	79,900	286,000	3,250	11.5
1982	99,800	377,000	3,980	15.1
		UNITED STATES		
1974	3,000	4,500	$ 150	$ .2
1975	7,900	12,400	300	.5
1976	14,500	26,900	570	1.1
1977	21,350	48,250	800	1.9
1978	26,450	73,400	1,050	2.9
1979	32,600	104,000	1,350	4.2
1980	41,300	142,000	1,700	5.7
1981	52,600	190,000	2,150	7.7
1982	65,800	250,000	2,600	10.0
		INTERNATIONAL		
1974	1,150	1,700	$ 50	$ .1
1975	2,700	4,400	100	.2
1976	7,100	11,500	300	.5
1977	10,150	21,650	420	.9
1978	13,500	34,500	540	1.4
1979	17,600	51,000	700	2.0
1980	21,800	71,000	880	2.8
1981	27,300	96,000	1,100	3.8
1982	34,000	127,000	1,380	5.1

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GENERAL-PURPOSE COMPUTER CENSUS

Counts in the General-Purpose Computer Census are based on the best information available to IDC -- but are estimates nevertheless. Computer makers, as a rule, do not directly supply this type of data. General-purpose computers -- as characterized by IBM's 370, 303X and competitors -- comprise the bulk of digital computers by value. They are primarily character or byte oriented and programmed in higher-level language.

Instead of being pegged to constantly shifting average values, size classes are based on currently marketed IBM products and other manufacturers' models that compete with them, e.g., a computer in Size Class 7 would compete with an IBM 3033 or 168. (Other classes can be checked under IBM's column.) Note that many mainframe manufacturers also offer smaller systems that are included in the Small Business Computer Census. An "x" in the last column means none on order from the original manufacturer.

AS OF JANUARY 1, 1978

NAME OF MANUFACTURER	COMPUTER MODEL	SIZE CLASS	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Amdahl	470V/5	6	$ 66,000	9/77	5	1	6	30
	470V/6, II	7	$ 99,000	6/75	64	16	80	65
	470V/7	7	$ 98,000	8/78	-	-	-	6
	Total				69	17	86	101
Burroughs	B2/3/500	3	$ 6,600	11/61	405	265	670	X
	B1710	2	$ 2,600	8/72	1,290	660	1,950	)
	B1720	3	$ 6,700	2/73	510	225	735	) 550
	B1800	3	$ 5,200	5/77	35	7	42	)
	B2500	4	$ 10,400	2/67	56	70	126	X
	B2700	4	$ 10,400	8/72	400	200	600	X
	B2800	4	$ 11,900	12/76	21	23	44	100
	B3500	4	$ 19,000	5/67	300	245	545	X
	B3700	4	$ 25,000	11/72	360	255	615	X
	B3800	4	$ 17,800	4/77	10	5	15	130
	B45/4700	5	$ 31,500	10/71	350	135	485	X
	B4800	5	$ 36,000	9/76	40	14	54	100
	B5500	5	$ 35,000	3/63	43	14	57	X
	B5700	5	$ 33,500	12/70	7	8	15	X
	B6700	6	$ 66,000	11/69	155	110	265	X
	B6800	5	$ 47,500	6/77	17	8	25	75
	B7700	7	$141,000	8/73	31	13	44	13
	B7800	7	$150,000	8/78	-	-	-	12
	Total				4,030	2,257	6,287	980
CDC	Omega 480-1	4	$ 10,000	6/77	8	-	8	25
	Omega 480-2	5	$ 14,200	5/78	-	-	-	15
	Cyber-71	4	$ 19,800	7/76	3	6	9	5
	Cyber-171	4	$ 26,500	8/77	1	-	1	5
	Cyber-72	5	$ 40,500	10/71	14	50	64	X
	Cyber-172	6	$ 47,500	7/75	15	35	50	10
	Cyber-73	6	$ 61,000	3/72	19	34	53	X
	Cyber-173	6	$ 77,000	9/75	7	37	44	15
	Cyber-74	7	$135,000	3/72	30	17	47	X
	Cyber-174	6	$ 92,000	9/75	10	14	24	25
	Cyber-175	7	$157,000	8/75	14	8	22	10
	Cyber-76	7	$180,000	3/72	7	10	17	3
	Cyber-176	7	$184,000	1/78	-	-	-	5
	G-20	4	$ 19,600	4/61	4	-	4	X
	1604	6	$ 42,000	1/60	8	-	8	X
	31/3150	4	$ 9,800	12/64	48	19	67	X
	3170	5	$ 22,000	12/70	19	19	38	X
	3200	4	$ 14,700	5/64	33	24	57	X
	3300	5	$ 34,500	9/65	86	59	145	X
	3400	5	$ 23,700	11/64	4	3	7	X
	3500	5	$ 31,000	1/69	30	10	40	X
	3600	6	$ 49,000	6/63	16	13	29	X
	3800	6	$ 60,000	12/65	12	2	14	X
	6200	6	$ 42,500	11/70	1	3	4	X
	6400	6	$ 63,000	5/66	50	40	90	X
	6500	6	$ 86,000	12/67	15	14	29	X
	6600	7	$120,000	8/64	47	22	69	X
	6700	7	$140,000	7/70	3	-	3	X
	7600	7	$195,000	1/69	23	6	29	X
	Star-100	7	$280,000	12/74	4	-	4	0
	Total				531	445	976	118
Cray	Cray 1A	7	$215,000	4/76	2	1	3	4
DEC	2040	4	$ 10,400	6/76	90	85	175	120
	2050	4	$ 18,800	5/77	20	3	23	25
	PDP-6	4	$ 10,000	10/64	7	1	8	X
	1040/50	4	$ 17,300	10/67	165	140	305	X
	1060/70	5	$ 19,500	6/72	120	95	215	20
	1080/90	6	$ 27,000	6/75	60	32	92	30
	Total				462	356	818	195
Honeywell	H-61/58	2	$ 2,200	6/74	115	660	775	) 400
	H-61/60	2	$ 3,200	6/74	78	830	908	)
	H-Level 62	3	$ 4,900	10/74	440	470	910	450
	H-64/20	4	$ 9,800	10/74	195	310	505	)
	H-64/30	4	$ 11,000	11/76	5	30	35	)
	H-64/40	4	$ 13,900	10/74	34	65	99	) 250
	H-64/50	4	$ 15,700	7/77	1	2	3	)
	H-64/60	4	$ 21,000	6/77	-	7	7	)
	H-66/05/07	4	$ 17,600	10/76	44	34	78	60
	H-66/10/17	5	$ 27,500	6/75	56	75	131	75
	H-66/20/27	5	$ 38,000	11/74	84	121	205	60
	H-66/40	6	$ 63,000	10/74	32	35	67	) 35
	H-66/60	6	$ 91,000	10/74	40	14	54	)
	H-66/80	7	$112,000	10/74	12	9	21	) 20
	H-68/80	7	$100,000	10/74	7	2	9	)
	S-60 Subtotal				1,143	2,664	3,807	1,350
	G-50	2	$ 1,900	8/70	240	1,090	1,330	X
	G-100	3	$ 4,900	4/66	85	800	885	X
	G-200	4	$ 10,000	4/61	115	28	143	X
	G-400	4	$ 16,000	5/64	205	205	410	X
	G-600	6	$ 80,000	4/65	34	26	60	X
	G-6023/25	5	$ 32,000	11/73	31	26	57	X
	G-6030/40	5	$ 42,000	6/71	54	135	189	X
	G-6050/60	6	$ 70,000	7/71	86	64	150	X
	G-6070/80	6	$108,000	7/71	50	27	77	X
	G-6180	7	$108,000	2/74	5	-	5	X
	Gamma 10	2	$ 2,500	7/64	-	550	550	X
	Gamma 30	4	$ 10,000	2/62	-	52	52	X
	G-Subtotal				905	3,003	3,908	X
	H-105/115	3	$ 6,400	3/70	270	290	560	X
	H-110/120	3	$ 5,400	1/66	125	125	250	X
	H-125	4	$ 8,600	12/67	22	145	167	X
	H-200	3	$ 7,500	3/64	250	120	370	X
	H-2020	3	$ 3,700	2/73	455	150	605	X
	H-2030	3	$ 6,000	1/73	105	56	161	X
	H-2040	4	$ 13,200	4/72	240	140	380	X
	H-1015	4	$ 14,500	4/71	30	27	57	X
	H-2050	4	$ 20,000	4/72	110	95	205	X
	H-1200	4	$ 14,600	2/66	220	91	311	X
	H-2015	4	$ 21,500	2/71	37	26	63	X
	H-2060	4	$ 20,500	4/72	42	21	63	X
	H-2200	4	$ 20,000	1/66	93	34	127	X
	H-2070	5	$ 34,500	5/72	35	2	37	X
	H-3200	5	$ 28,500	2/70	91	36	127	X
	H-4200	5	$ 46,500	9/68	12	3	15	X
	H-8200	6	$ 75,000	2/69	14	10	24	X
	H-4/1400	4	$ 14,000	12/61	12	16	28	X
	H-8/1800	5	$ 35,000	12/60	10	13	23	X
	H-Subtotal				2,173	1,400	3,573	X
	Total				4,221	7,067	11,288	1,350

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AS OF JANUARY 1, 1978

NAME OF MANUFACTURER	COMPUTER MODEL	SIZE CLASS	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
IBM	System/3-4	2	$ 1,300	6/76	510	140	650	400
	System/3-6	2	$ 1,800	12/70	940	915	1,855	X
	System/3-8	2	$ 2,000	6/75	5,160	4,760	9,920	2,800
	System/3-10	2	$ 2,600	1/70	8,020	5,700	13,720	X
	System/3-12	3	$ 3,600	3/76	4,450	2,580	7,030	3,500
	System/3-15	3	$ 6,500	3/74	2,950	1,770	4,720	700
	S/3 Subtotal				22,030	15,865	37,895	7,400
	3031	6	$ 62,000	3/78	-	-	-	500
	3032	6	$111,000	3/78	-	-	-	500
	3033	7	$178,000	3/78	-	-	-	500
	370/115	3	$ 9,100	4/74	1,150	2,600	3,750	X
	370/125	4	$ 12,800	6/73	1,100	2,020	3,120	X
	370/135	4	$ 20,500	5/72	1,820	2,550	4,370	X
	370/138	4	$ 20,000	11/76	1,270	1,220	2,490	2,200
	370/145	5	$ 38,500	7/71	1,600	1,660	3,260	X
	370/148	5	$ 34,500	3/77	860	820	1,680	1,800
	370/155	6	$ 70,000	2/71	475	325	800	X
	370/158	6	$100,000	5/73	1,500	1,400	2,900	X
	370/165	7	$130,000	6/71	120	42	162	X
	370/168	7	$185,000	7/73	525	305	830	X
	370/195	7	$275,000	3/71	12	4	16	X
	370 Subtotal				10,432	12,946	23,378	5,500
	360/20	3	$ 2,900	12/65	1,080	1,900	2,980	X
	360/22	3	$ 3,700	7/71	100	120	220	X
	360/25	3	$ 8,300	10/68	100	390	490	X
	360/30	4	$ 11,200	6/65	1,730	900	2,630	X
	360/44	4	$ 18,700	7/66	44	42	86	X
	360/40	4	$ 19,000	6/65	1,100	780	1,880	X
	360/50	5	$ 33,500	8/65	500	275	775	X
	360/65	6	$ 72,000	11/65	400	150	550	X
	360/67	7	$146,000	6/66	19	10	29	X
	360/75	7	$122,000	1/66	25	17	42	X
	360/85	7	$183,000	10/69	1	2	3	X
	360/9X	7	$197,000	11/67	10	5	15	X
	360 Subtotal				5,109	4,591	9,700	X
	1130	2	$ 2,600	2/66	1,350	1,200	2,550	X
	1401	3	$ 3,700	9/60	500	440	940	X
	1401-G	2	$ 2,400	5/64	14	9	23	X
	1401-H	2	$ 1,750	6/67	5	-	5	X
	1410	4	$ 17,100	11/61	33	26	59	X
	1440	3	$ 4,700	4/63	66	83	149	X
	1460	4	$ 10,000	10/63	14	10	24	X
	1620	3	$ 2,700	9/60	110	91	201	X
	7010	5	$ 25,500	10/63	6	3	9	X
	7030	7	$160,000	5/61	2	-	2	X
	7040/44	5	$ 30,000	6/63	9	13	22	X
	7070/74	5	$ 27,000	3/60	77	11	88	X
	7080	6	$ 60,000	8/61	24	-	24	X
	7090/94	6	$ 71,000	8/60	32	9	41	X
	Subtotal				2,242	1,895	4,137	X
	Total				39,813	35,297	75,110	12,900
Itel	AS/4	5	$ 18,800	6/77	20	-	20	45
	AS/5	6	$ 37,500	3/77	35	5	40	75
	AS/6	6	$ 52,000	4/78	-	-	-	15
	Total				55	5	60	135
NCR	8350	2	$ 2,900	6/77	10	-	10	120
	8430	3	$ 4,200	5/78	-	-	-	50
	8450	3	$ 6,200	11/77	3	-	3	140
	8550	3	$ 10,000	4/76	260	150	410	200
	8560	4	$ 12,100	11/77	5	-	5	100
	8570	4	$ 15,600	5/76	30	30	60	60
	8580	5	$ 30,000	8/78	-	-	-	15
	Century-50	2	$ 1,700	2/71	435	45	480	X
	Century-75	2	$ 2,200	7/76	90	-	90	X
	Century-100	3	$ 3,300	9/68	315	695	1,010	X
	Century-101	3	$ 4,000	10/72	975	740	1,715	X
	Century-151	3	$ 5,100	2/75	290	100	390	X
	Century-200	4	$ 7,600	9/69	260	395	655	X
	Century-201	4	$ 11,200	8/74	300	155	455	X
	Century-251	4	$ 20,000	11/73	75	74	149	X
	Century-300	5	$ 25,000	2/72	85	83	168	X
	315	3	$ 3,400	5/62	85	125	210	X
	315-RMC	4	$ 10,400	9/65	20	20	40	X
	Total				3,238	2,612	5,850	685
Singer	System 10	2	$ 2,700	10/70	1,450	1,300	2,750	X
Sperry-Univac	III	4	$ 27,000	8/62	80	28	108	X
	SS-80/90	3	$ 8,500	8/58	-	5	5	X
	418 I/II	4	$ 10,700	6/63	47	52	99	X
	418 III	4	$ 40,500	6/69	44	88	132	X
	491/492	5	$ 28,500	12/61	13	10	23	X
	494	6	$ 79,000	2/66	61	58	119	X
	1004	2	$ 1,100	2/63	255	230	485	X
	1005	2	$ 2,000	4/66	205	82	287	X
	1050	3	$ 9,300	9/63	120	45	165	X
	1106	6	$ 44,000	12/69	86	225	311	X
	1107	6	$ 60,000	10/62	4	8	12	X
	1108	7	$ 91,000	9/65	152	91	243	X
	1110	7	$138,000	6/72	58	75	133	X
	9200	2	$ 2,300	6/67	545	615	1,160	X
	9300	3	$ 5,000	9/67	440	470	910	X
	9400/80	4	$ 12,500	5/69	230	420	650	X
	90/25	3	$ 3,800	8/77	50	50	100	350
	90/30	3	$ 7,600	2/75	625	850	1,475	500
	90/60	4	$ 23,000	1/74	92	97	189	50
	90/70/9700	5	$ 29,000	8/72	16	36	52	10
	90/80	5	$ 65,000	12/76	14	3	17	25
	1100/10	5	$ 35,500	4/76	41	48	89	65
	1100/20	5	$ 47,000	4/75	19	32	51	20
	1100/40	6	$ 78,000	7/75	35	45	80	45
	1100/80/81/82	6	$112,000	3/77	3	5	8	15
	1100/83	7	$195,000	6/78	-	-	-	2
	1100/84	7	$238,000	6/78	-	-	-	2
	Subtotal				3,235	3,668	6,903	1,084
	301	4	$ 6,900	10/60	33	4	37	X
	501	5	$ 16,600	6/59	4	-	4	X
	3301	5	$ 23,500	7/64	41	-	41	X
	Spectra 70/15	3	$ 4,600	9/65	3	-	3	X
	Spectra 70/25	3	$ 7,800	9/65	-	7	7	X
	Spectra 70/35	4	$ 14,400	1/67	55	1	56	X
	Spectra 70/45	5	$ 27,000	11/65	155	8	163	X
	Spectra 70/46	5	$ 44,500	11/68	28	1	29	X
	Spectra 70/55	5	$ 42,500	11/68	5	-	5	X
	Spectra 70/60	6	$ 50,000	9/70	25	-	25	X
	Spectra 70/61	6	$ 55,000	3/71	4	-	4	X
	Spectra 1600	3	$ 4,300	1/69	34	-	34	X
	Spectra 70/2	4	$ 13,900	7/71	34	-	34	X
	Spectra 70/3	4	$ 22,500	10/71	17	-	17	X
	Spectra 70/6	6	$ 36,500	10/71	34	-	34	X
	Spectra 70/7	6	$ 44,500	10/71	22	-	22	X
	Subtotal				494	21	515	X
	Total				3,729	3,689	7,418	1,084
Xerox	Sigma 5	4	$ 14,600	8/67	122	21	143	X
	Sigma 6	4	$ 23,500	11/70	32	14	46	X
	Sigma 7	5	$ 28,500	12/66	58	9	67	X
	Sigma 8	4	$ 21,500	9/71	5	6	11	X
	Sigma 9	6	$ 54,000	11/71	68	30	98	X
	530	3	$ 4,000	8/73	105	38	143	X
	550/560	4	$ 14,200	11/74	34	5	39	X
	940	5	$ 26,000	4/66	39	3	42	X
	9300	3	$ 8,500	11/64	15	4	19	X
	Total				478	130	608	X
TOTAL					58,078	53,176	111,254	17,552

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MINICOMPUTER CENSUS

The categorization of certain computers as "small business computers" is based on marketplace definitions as perceived by IDC. SBCs are those small general-purpose computers marketed by the major mainframers and their competitors to smaller businesses and first-time users. They include offerings from the major mainframers (such as IBM's System/32); products such as DEC's Datasystem/300 from the minimakers but aimed at commercial first-time users; equipment from firms (such as Qantel) that manufacture only SBCs; and products from companies that assemble systems from other's minicomputers as Basic/Four did before beginning its own manufacturing operations.

AS OF JANUARY 1, 1978

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	SIZE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ORDERS FOR 1978 INSTALLATION
Artronix	PC-12/7	12	T	20	45	9/71	135	40	175	X
Bytronix	Series 1000	16	T	6		12/77	5	5	10	200
	Series 2000	16	T	8		/78	0	0	0	NA
Century Computer Corp.	C-200	8	T	5	7	2/71	150	0	150	NA
Cincinnati Milacron	CIP/2000 Series	8	T	4	17	7/69	3,050	480	3,530	1,800
	CIP/4000	16	T	4	17	12/76				
Compiler Systems, Inc.*	CSI-16	16	T	11	20	11/70	80	10	90	X
	CSI-24	24	T	15	30	12/70	35	5	40	X
Computer Automation, Inc.	108/208/808	8	T	5	11	4/68	280	30	310	X
	116	16	T	8	16	8/70	200	50	250	X
	216	16	T	8	20	7/69	350	45	395	X
	816	16	T	10	15	12/68	40	5	45	X
	Alpha-8, Naked Mini-8	8	T	2	3	5/72	4,060	1,087	5,147	X
	Alpha-16, Naked Mini-16	16	T	3	8	10/71				400
	LSI-2/10,2/20,2/60	16	T,T,S	2	5	12/73	12,100	1,279	13,379	3,500
	LSI-3/05	16	M	1	2	2/76	830	225	1,055	900
	LSI-4/10	16	M	1	2	6/77	44	10	54	
	LSI-4/30	16	T	2	4	6/77	30	8	38	1,000
	LSI-4/90	16	S	4	9	6/77	10	2	12	
	Total						17,944	2,741	20,685	
Computer Talk, Inc.	CT-400	16	T	25	30	9/75	5	0	5	12
	CT-407	16	T	32	37	12/77	1	0	1	4
Control Data Corp.	1700	16+2	S	37	160	3/66				X
	1700-SC	16+2	S	20	60	9/70				X
	System 17	16+2	T	14	39	2/74	970	610	1,580	
	Cyber-18-10	16+2	T	14	40	/76				350
	Cyber-18-20	16+2	T	16	75	/76				
	Cyber-18-30	16+2	S	110	116	9/76				
	Elbit-100	12	T	6	8	6/67	5	445	450	X
Data General Corp.	Nova	16	T	6	12	2/69	750	400	1,150	X
	Micronova	16	M	2	4	11/76	1,220	310	1,530	2,500
	Nova-2 Series	16	T	3	8	10/73	5,500	1,800	7,300	500
	Nova-3/4	16	T	2	4	1/76	1,550	250	1,800	
	Nova-3/12	16	T	12	17	1/76	4,400	1,550	5,950	8,900
	Nova-3/D	16	T	12	35	10/76	500	225	725	
	Nova-800/820	16	T	7	34	3/71	2,150	700	2,850	350
	Nova-830/840	16	S	16	43	7/73	625	350	975	
	Nova-1200 Series	16	T	3	11	12/70	8,300	3,300	11,600	400
	Supernova, SC	16	T	9	27	4/70	300	150	450	X
	Eclipse-S/100	16	S	12	30	2/75	270	60	330	
	Eclipse-S/130	16	S	11	30	8/77	400	50	450	1,300
	Eclipse-S/200	16	S	16	48	2/75	1,150	450	1,600	
	Eclipse-S/230	16	S	15	40	10/76	630	100	730	1,100
	Eclipse-C/300	16	S	24	115	2/75	310	70	380	
	Eclipse-C/330	16	S	30	110	11/76	310	40	350	550
	Eclipse-M/600	16	S	164		5/78	0	0	0	50
	Subtotal						28,365	9,805	38,170	
(Digital Computer Controls)	D-112	12	T	3	12	8/70	700	400	1,100	X
	D-116	16	T	5	10	11/71	7,450	1,350	8,800	X
	D-416/616	16	T/S	3	7	9/75	125	15	140	X
	Mod-5	16+2	T	3	6	2/76	80	10	90	X
	Subtotal						8,355	1,775	10,130	
	Total						36,720	11,580	48,300	
Datamate Computer Systems*	DM-16	16	T	17	26	11/69	12	0	12	X
	DM-70	16	T	9	15	12/70	25	0	25	X
	DM-70/ROM	16	T	4	6	10/70	NA	0	NA	X
	ECP-18	18	T	14	16	11/66	21	0	21	X
Datum	Enhancer E1/16	16	T	8	15	3/76	15	3	18	20
Digiac Corp.*	3060		T	9	13	1/70	70	20	90	X
	3080	25	T	20	25	12/64	14	2	16	X
Digital Equipment Corp.	PDP-8/a, e, f, m	12	T	4	14	4/71	23,900	9,850	33,750	7,000
	PDP-8/i, l, s	12	T	8	27	5/65	5,765	3,685	9,450	X
	PDP-9, 9L	18	T	35	50	12/66	290	160	450	X
	PDP-11/04, 05, 10, 15, 20	16	T	5	15	3/70	19,050	11,400	30,450	6,000
	PDP-11/34, 35, 40	16	T	9	35	1/73	9,550	4,950	14,500	8,000
	PDP-11/45, 50, 55	16	S	24	85	4/72	2,550	1,100	3,650	500
	PDP-11/60	16	S	26	70	6/77	120	100	220	800
	PDP-11/70	16	S	60	160	7/75	2,050	800	2,850	2,400
	PDP-11/03, LSI-11	16	M	2	2	6/75	18,650	2,850	21,500	25,000
	PDP-12	12	T	13	45	4/69	510	255	765	X
	PDP-15, XVM	18	T	15	80	2/70	550	320	870	0
	VAX-11/780	32	S	128		/78	0	0	0	100
	Total						82,985	35,470	118,455	
Digital Scientific Corp.	Meta-4/4000	16	S	29	90	4/70	140	15	155	X
	Meta-4/5020	16	S	50	99	4/78	0	0	0	60
	Meta-4/5010	16	S	21	40	7/78	0	0	0	24
Electronic Associates, Inc.	Pacer-100	16	T	15	40	5/72	132	108	240	NA
Foto-Mem, Inc.*	Centaur-100	8	T	6	20	4/70	25	0	25	X
General Automation Inc.	GA-18/30	16	S	18	50	7/69	790	210	1,000	0
	SPC-12	8	T	4	16	1/68	2,900	800	3,700	0
	SPC-16	16	T	5	25	5/70	5,200	2,250	7,450	1,200
	16/110/220	16	M	1	3	12/75	770	130	900	700
	16/330	16	T	3	10	1/76	185	15	200	200
	16/440	16	S	9	30	7/75	640	260	900	200
	16/550	16	S			3/78	0	0	0	50
	Total						10,485	3,665	14,150	
GRI Computer	909 Series	16	T	4	9	1/70	320	150	470	X
	99/30	16	T	5	15	6/72	578	268	846	200
	99/40	16	T	6	17	6/72	117	68	185	NA
	99/10	16	T	3	5	6/72	18	0	18	NA
	Total						1,033	486	1,519	
GT&E	Tempo I	16	T	14	36	1/70	160	40	200	NA
	Tempo II	16	T	6	10	6/72	950	50	1,000	NA
Harris	6024/1	24	S	69	135	5/69	22	0	22	X
	6024/3	24	S	49	90	2/70	119	0	119	X
	Slash 4	24	S	24	110	8/73	207	18	225	35
	Slash 5	24	S	16	50	5/72	400	24	424	85
	Slash 6	24	S	20	70	12/76	44	4	48	50
	Slash 7	24	S	45	180	10/75	14	1	15	5
	Series 100	24	S	85	190	10/75	86	13	99	70
	Series 200	24	S	179	240	10/75	39	4	43	25
	Total						931	64	995	

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AS OF JANUARY 1, 1978

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	SIZE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ORDERS FOR 1978 INSTALLATION
Hewlett-Packard	2100A	16	T	7	15	6/71	7,850	3,350	11,200	100
	2100S	16	T	16	35	8/73	1,775	1,375	3,150	100
	2114-A/B	16	T	9	16	5/68	1,035	495	1,530	X
	2115-A	16	T	15	26	11/67	240	100	340	X
	2116-A/B/C	16	T	20	40	11/66	1,220	550	1,770	X
	21MX-K	16	M	2	4	6/76	300	200	500	400
	21MX-M	16	T	4	15	6/74	6,200	3,200	9,400	3,500
	21MX-E	16	T	6	20	1/77	1,200	700	1,900	2,500
	3000	16	S	100	185	11/72	) 600	) 400	) 1,000	) 650
	3000-II	16	S	100	185	4/76	)	)	)	)
	Total						20,420	10,370	30,790	
HIS - GE/PAC	30	8	T	7	35	5/69	225	50	275	X
	3010, 2	16	T	13	90	5/70	25	1	26	X
Honeywell	112	12	T	5	10	11/69	222	48	270	X
	116/316/416/516	16	T	8	62	10/66	2,405	1,295	3,700	X
	700 Series	16	T	16	65	6/72	1,850	1,450	3,300	300
	164X Series	16	T	144	440	12/69	20	8	28	X
	6/06	16	T	8	42	1/76	)	)	)	)
	6/34	16	T	3	18	1/76	) 750	) 450	) 1,200	) 1,600
	6/36	16	T	8	35	1/76	)	)	)	)
	6/43	16	T	10	45	1/77	)	)	)	)
	Total						5,497	3,302	8,799	
Information Technology, Inc.*	4900/10	16	T	10	20	10/65	25	0	25	X
Interdata	1	8	T	4	11	9/70	210	77	287	X
(Perkin-Elmer)	2, 3, 4, 5	16	T	9	21	5/67	614	153	767	X
	13, 15, 16, 18	16	T	15	33	9/69	14	14	28	X
	50, 55	16+1	T	7	33	4/72	133	40	173	X
	70	16	T	9	65	12/71	1,057	340	1,397	30
	74	16	T	3	34	2/73	300	56	356	X
	80, 85	16	T	15	50	7/72	70	18	88	X
	5/16	16	M	1	5	1/77	55	25	80	100
	6/16	16	T	2	15	1/76	675	265	940	800
	7/16	16	T	3	18	2/74	3,145	788	3,933	900
	8/16	16	T	4	25	1/77	90	40	130	175
	7/32	32	S	10	35	7/74	640	192	832	350
	8/32	32	S	55	160	6/75	265	99	364	250
	Total						7,268	2,107	9,375	
IBM Corp.	Series/1	16	T	10	50	11/76	1,300	100	1,400	4,000
Keronix	IDS-16/8	16	T	5	5	4/74	)	)	)	)
	IDS-16/10	16	T	4	5	4/74	) 1,450	) 50	) 1,500	) 1,700
	IDS-16/12	16	T	4	4	4/74	)	)	)	)
Lockheed Electronics	LEC-16	16	T	11	22	3/69	495	55	550	) 30
Co., Inc.	LEC-Jr	16	T	8	16	1/71	1,975	375	2,350	)
	SUE	16	T	6	11	9/72	2,240	360	2,600	400
Microdata Corp.	400	8	T	3	4	1/70	155	0	155	X
	800 Series	8	T	6	11	5/69	2,055	1,380	3,435	X
	1600	8	T	5	11	2/72	6,603	1,132	7,735	1,100
	3200/3230	16	S	8	14	3/74	110	100	210	20
	Micro One	8	M	1	3	11/74	800	120	920	X
	Total						9,723	2,732	12,455	
Minicomp*	MD-708	8	T	5	7	8/70	50	0	50	X
Modular Computer	Modcomp-I	16	T	2	9	10/71	690	140	830	50
Systems	Modcomp-II	16	T	4	40	3/71	1,535	395	1,930	650
	Modcomp-III	16	S	13	44	12/70	70	5	75	X
	Modcomp-IV	16/32	S	42	100	5/74	255	100	355	100
	Classic 7860	16/32	S	37	100	1/78	0	0	0	50
	Total						2,550	640	3,190	
Motorola Communications Division	MDP-1000	8	T	8	19	2/69	75	0	75	X
Omnitec (BIT)*	480	8	T	6	17	12/66	195	3	198	X
	483	8	T	9	33	1/70	115	40	155	X
Prime Computer	100	16	T	4	11	4/73	222	582	804	250
	200	16	T	6	22	11/72	311	64	375	100
	300	16	S	12	60	9/73	290	228	518	250
	400/500	16	S	50	152	6/76	120	50	170	200
	Total						943	924	1,867	
Raytheon Data Systems	703	16	T	13	23	10/66	179	33	212	X
	704	16	T	10	18	3/70	690	200	890	X
	706	16	T	19	30	5/69	75	17	92	X
	RDS-500	16	S	10	16	12/73	650	100	750	450
	Total						1,594	350	1,944	
Redcor Corp.*	RC-70	16+2	T	15	30	7/68	100	40	140	X
Sperry-Univac	520i	16	T	6	13	9/68	330	170	500	X
(Varian)	620/a	16	T		75	12/65	120	30	150	X
	620/f, f-100	16	T	10	23	6/70	470	220	690	X
	620i	16/18	T	10	20	12/65	920	380	1,300	X
	620/L & 100c	16	T	5	12	2/71	720	320	1,040	X
	620/L-100	16	T	6	14	6/72	970	480	1,450	200
	R620/i, R622/i	16/18	T	15	29	6/69	175	70	245	20
	V-72	16	T	10	45	2/74	750	330	1,080	200
	V-73	16	S	16	45	11/72	1,190	530	1,720	20
	V-74	16	S	40		5/74	210	90	300	X
	V-75	16	S	39		8/75	120	50	170	X
	V-76	16	S	8		1/76	530	200	730	200
	V-77-200	16	M	2	5	1/77	200	60	260	)
	V-77-400	16	T	5	19	12/76	110	50	160	) 2,500
	V-77-600	16	S	8	40	3/77	150	80	230	)
	Total						6,965	3,060	10,025	
Systems Computer Corp.*	1000	8	T	1	4	1/71	400	200	600	X
Systems Engineering	32/35	32	S	30	80	9/76	30	10	40	30
Laboratories	32/55	32	S	50	125	8/75	230	80	310	120
	32/75	32	S	70	150	3/78	0	0	0	50
Tandem Computers, Inc.	T16	16	S	135	224	5/76	96	8	104	100
Telefile Computer Products	TCP-16	16				/77	NA	NA	NA	NA
Texas Instruments	960-A/B	16	T	4	30	12/71	2,650	1,250	3,900	400
	980-A/B	16	S	5	40	10/72	2,900	1,350	4,250	400
	990/4	16	M	1	5	6/76	3,300	1,300	4,600	4,000
	990/10	16	T	2	15	3/76	1,900	450	2,350	1,800
	Total						10,750	4,350	15,100	
Unicom, Inc.*	CP-8	8	T	3		2/70	343	165	508	X
Unicomp*	Comp-16	16	T	11	29	6/70	26	0	26	X
	Comp-18	18	T	12	38	8/70	38	0	38	X
Westinghouse Electric	P-50	14	T	16	23	8/64	182	40	222	X
	P-2000	16	T	10	27	8/69	111	90	201	X
	2500	16	T	10	30	11/71	274	90	364	100
Xerox*	CE-16, 16/A	16	T	8	23	6/69	35	10	45	X
	Sigma-2	16	T	24	125	12/66	170	80	250	X
TOTAL							231,763	85,470	317,233	

*) Not currently active in manufacturing or marketing of minicomputers.
NA) Data is not available.
X) Indicates minicomputer models not in new production.

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SMALL BUSINESS COMPUTER CENSUS

The categorization of certain computers as "minicomputers" is based on marketplace definitions as perceived by IDC. Minis are general-purpose in design but sold as tools, not just solutions; are available from the makers as complete systems, not just boards; are available to OEMs and usually discounted in volume buys; and are part of a family that has at least one product in the $2,000-$25,000 price range and comes with at least 4K RAM. Size classes are: (S) Supermini; (T) Traditional Mini; (M) Micromini.

AS OF JANUARY 1, 1978

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ORDERS FOR 1978 INSTALLATION
Advanced Information Design	System 3000	Interdata X/16		24	39	3/75	36	0	36	46
	System 4000	Interdata X/32		49		/78	NA	NA	NA	NA
American Management Systems, Inc.	AMS OE/IC	Nova-3		14		1/76	4	0	4	NA
	GFS-11	PDP-11/34		75	100	8/76	2	0	2	18
Anderson-Jacobson, Inc.	1400	AJ 1400	a	16	22	1/70	260	15	275	X
	1500	AJ 1500		20	25	7/77	40	0	40	NA
Applied Data Communications	Event	Event		13	20	2/77	47	3	50	350
Applied Data Processing, Inc.	Resource/100	Nova 3/12		39	88	6/76	10	0	10	15
Ball Computer Products	DASL	Nova-2/10		38	40	6/75	3	0	3	X
Basic/Four Corp.	200	BFC 1340		29	29	2/78	0	0	0	1,000
	350	BFC 1300, Microdata	b	34	34	9/71	500	576	1,076	X
	400	BFC 1300, Microdata	b	37	45	9/71	1,400	1,268	2,668	800
	500	BFC 1300, Microdata	b	39	50	7/72	100	82	182	X
	600	BFC 1300, Microdata	b	51	65	3/75	300	308	608	X
	610	BFC 1320		51	68	1/78	0	0	0	350
	700	BFC 1320		115	130	/77	50	38	88	160
Basic Timesharing, Inc.	4000/15	BTI 4020		36	40	1/76	216	4	220	200
	4000/25	BTI 4020		56	65	1/76	317	8	325	300
Bicaroe Corp.	System 2	Bicaroe		16		/78	0	0	0	NA
Binary Data Systems	UCOM-1	Nova-3		40	60	11/75	48	0	48	25
	UCOM-2	Dual Nova-3		95	120	1/76	20	0	20	6
	UCOM-3	Eclipse		120	170	6/76	4	0	4	10
	UCOM-4	Dual Nova-3/D		200	285	5/77	16	0	16	30
Burroughs Corp.	B80	B80		20	35	11/76	850	950	1,800	2,000
	B700	B700		20	67	3/73	2,400	1,650	4,050	1,500
	B800	B800		32	52	5/77	300	170	470	
Business Controls Corporation	System 80	PDP-8/a		25	40	6/71	100	0	100	30
	System 80	PDP-11/34/45/60/70		45	75	6/75	25	0	25	15
Business Systems Products, Inc.	Adviser II	Computer Auto.		35	45	7/76	30	0	30	NA
	Adviser III	Computer Auto.		65	85	9/76				NA
Cascade Data, Inc.	80/20, 30, 40	Concept		28	43	1/70	50	0	50	X
	Concept II	Concept		25	45	6/75	200	15	215	30
	Concept III	Concept		27	47	1/78	0	0	0	10
	Concept IV	Concept		18	23	4/78	0	0	0	10
Century Computer Corp.	C-400	C-200, 400		34	45	3/75	150	30	180	NA
	C-700	C-200, 400		38	55	6/76	40	10	50	NA
	C-900	C-400		27	40	4/77	100	20	120	NA
	C-1000	C-400		40	50	6/77	15	0	15	NA
	Opus III	C-200		15	22	2/71	560	40	600	X
Cincinnati Milacron	George-40	CIP/2200B		16	20	2/77				
	George-60	CIP/2200B		26	34	/76				
	George-70	CIP/2200B		26	35	/76	545	120	665	350
	George-80	CIP/4400		43	60	12/76				
	Other	CIP/2200B		23	34	/74				
Clary Data Systems*	404	Clary		6	30	1/70	100	32	132	X
Complete Computer Systems	II-3	Nova-3/12		28	42	10/76	18	0	18	
	III-3	Nova-3/12		42	63	10/76	10	0	10	20
	IV-3	Eclipse-S/130		55	80	10/76	7	0	7	
Compucorp	402	Compucorp 3000		13	15	1/76	15	455	470	X
	450	Compucorp 3000		20	22	4/76	40	115	155	NA
	625	Z80		7	10	9/77	50	150	200	NA
Compudata Systems	Series/1	IBM Series 1		26		10/77	2	0	2	100
Computer Hardware, Inc.	2120	CHI		15	50	5/75	10	0	10	X
	2130C	CHI		32	75	7/74	150	5	155	20
	2130D	CHI		44	120	1/78	0	0	0	10
	3230	CHI		15	50	6/76	5	0	5	15
	4210	CHI		10	12	9/77	2	0	2	30
Computer Horizons Corp.	CHI Distribution System	PDP-11/34, 70		30	200	10/76	9	0	9	8
Computer Interactions, Inc.	Compo II-8	PDP-8/e, f, m		45	60	11/72	163	0	163	40
	Compo II-11	PDP-11		50	60	6/75	97	0	97	20
Data General	CS/40	Nova-3/12		33	40	10/77	25	0	25	NA
	DCC 1500	DCC-416	c	16		/76	15	0	15	X
	DCC 2500	DCC-Mod 5	c	29		/76	25	0	25	X
	DCC 3700	DCC-616	c	40		/76	10	0	10	X
	Design Data N312	Nova-3/12	d	31	75	8/75	120	10	130	X
	Design Data EC300	Eclipse C/300	d	60	150	3/76	50	10	60	X
Decision Data Computer Corp.	System/4	System/4		23	37	8/76	15	0	15	125
Diablo	3200	8080	e	19	23	1/77	180	170	350	600
Digital Equipment Corp.	Datasystem 300	PDP-8, PDP-11		14	28	/72	3,600	1,500	5,100	2,500
	Datasystem 500	PDP-11		58	110	/72	650	400	1,050	500
Digital Systems Corp.	Galaxy/5-130	Galaxy/5		33	50	1/76	8	0	8	16
	Galaxy/5-140	Galaxy/5		61	80	8/76	8	0	8	8
	Galaxy/5-150	Galaxy/5		100	130	12/76	2	0	2	4
	Galaxy/5-160	Galaxy/5		150	180	8/77	2	0	2	2
	Galaxy/5-170	Galaxy/5		230	280	9/77	2	0	2	2
Dimis, Inc.	Total 100	Modcomp II		155	180	7/74	12	0	12	18
Display Data Corp.	Insight	Microdata 1600/30		38	62	1/74	300	0	300	500
Educomp Corp. (Quodata)	E-100,200,300,400	PDP-8		7	25	/72				NA
	E-600,700,800,900	PDP-11		44	100	/75	188	9	197	NA
	QDP/78	PDP-8		10	10	/77				NA
	ECS/78	PDP-8		10	11	/77				NA
Financial Computer Corp. (Fedder)	System III/6	System III		19	25	9/77	25	0	25	NA
	System III/8	System III		23	32	9/77	20	0	20	NA
	System III/10	System III		30	45	1/75	400	50	450	NA

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AS OF JANUARY 1, 1978

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Gemini Information Systems	Gispac/16	Interdata X/16		48	65	4/76	20	0	20	10
	Gispac/32	Interdata X/32		86	110	4/76	11	0	11	5
	Gispac/1	Series/1		48		/78	0	0	0	20
General Automation, Inc.	DM-130/2	SPC-16/45		28	28	12/74	125	225	350	25
	DM-130	SPC-16/45		30	38	12/74	70	60	130	10
	DM-140	SPC-16/65		48	80	1/75	10	18	28	X
General Information Systems	GIS-350 ABLE	PDP-11/34		42	47	1/76	8	0	8	12
General Robotics Corp.	11/X3	LSI-11		5	7	7/76	75	30	105	50
	FD/X3	LSI-11		15	22	7/76	100	50	150	300
	CD/X3	LSI-11		25	39	9/77	20	10	30	100
GRI Computer Corp.	System 99	GRI 99/50		30	35	11/74	140	50	190	NA
	System 99/E	GRI 99/52		43	50	11/77	5	3	8	NA
IBM Corp.	System/32			33	42	3/75	14,800	5,500	20,300	10,000
	System/34			35	50	12/77	10	0	10	2,000
International Computing Company*	System 95/99	Nova-2/10		24	35	10/72	9	0	9	X
Lockheed Electronics Co., Inc.	System III	Lockheed SUE		30	50	1/73	340	60	400	NA
Logical Machines Corp.	ADAM	ADAM		35	38	4/75	240	120	360	480
Martin Wolfe Inc.*	Mesa Two 7000	DCC-116		54	81	12/71	140	0	140	X
	Mesa Two 4000	DCC-116		62	93	2/76	3	0	3	X
Microdata	Reality	Microdata 1600		32	60	12/73	1,170	200	1,370	800
	Express	Microdata Express		39	50	11/76	10	0	10	NA
Mini-Computer Systems, Inc.	Micos	Nova-3/12		50	69	/73	590	220	810	230
	Micos II	Nova-3/4		29	31	8/77	10	30	40	90
Minuteman Computer Corp.	1774	Nova-2/4		35	40	11/71	35	0	35	NA
	1775	Nova-2/10		37	44	3/72	15	0	15	NA
	1776	Nova-2/10		40	59	3/72	21	0	21	NA
	1776/A	Nova-3/12		40	65	5/77	5	0	5	NA
Mylee Digital Sciences, Inc.	3000 Series	Mylee 3G		25	45	5/76	75	0	75	40
NCR Corp.	8130	NCR		20	24	3/78	0	0	0	300
	8150	NCR		29	38	12/77	5	0	5	300
	8200	NCR		33	66	9/75	800	1,050	1,850	X
	8230	NCR		29	53	6/77	100	0	100	200
	8250	NCR		42	60	12/76	250	950	1,200	1,500
Norfield Datasystems, Inc.*	Nova-system	Nova		35	50	6/73	20	0	20	X
Northrup Data Systems	BDS 500	Microdata 1600		30	44	2/78	0	0	0	NA
	BDS 700	Microdata 1600		39	50	3/77	5	0	5	NA
	BDS 1000	Microdata 1600		50	75	6/72	55	0	55	NA
	BDS 2000	Microdata 1600		63	100	10/73	65	0	65	NA
Pick & Associates	Pick System	7764		64	72	11/73	12	4	16	100
	Pick System	7781		81	90	10/77	3	0	3	50
Programmed Control Corp.	Prophet 21/1	TI 960-B		42	75	/72	30	0	30	NA
	Prophet 21/2	TI 990/10		57	100	1/78	0	0	0	NA
Q1 Corporation	LMC	Q1		21		2/74	500	0	500	250
	LITE	Q1		21		2/77	250	0	250	750
Qantel	800/900	Q7		28	29	5/75	93	71	164	X
	950	Q7		32	36	11/75	382	102	484	NA
	960	Q7.5		48	56	11/76	15	5	20	X
	1200	Q7		42	59	11/75	213	23	236	X
	1300	Q7.5		42	59	11/75	44	18	62	X
	1400	Q7.5		44	60	5/77	134	21	155	NA
Randal Data Systems	Link-100	Randal		13	23	10/75	185	0	185	40
	Link-140	Randal		13		/78	0	0	0	120
	Link-200	Randal		27	35	10/76	132	0	132	160
	Link-300	Nova-2/10		34	45	6/74	) 27	) 0	) 27	X
	Link-400	Nova-2/10		36	45	6/74	)	)	)	X
	Link-500	Randal		46	50	10/77	20	0	20	80
A.O. Smith	Mesa Two	Nova-3		58	58	5/77	8	0	8	NA
Span Management Systems	TSS-2	IBM Series/1		31	31	/77	10	3	13	900
Sperry-Univac	BC-7	Univac		28	45	4/77	395	5	400	800
STC Systems	Ultimacc-2000	Nova-1200		51	85	9/72	90	2	92	10
	Ultimacc-3010	Nova-3/D		55	112	1/75	75	2	77	20
	Ultimacc-3080	Nova-3/D		84	143	11/75	7	0	7	10
Tri-Star, Inc.	TTK-10	Nova-3/12		45	55	2/76	12	0	12	NA
	TEK-80	Nova-3/12		52	67	4/76	4	0	4	NA
Vanguard Computer Systems, Inc.	V500	Raytheon RDS 500		65	85	3/76	5	2	7	20
	V400	Raytheon RDS 500		45	52	6/77	1	0	1	10
Wang Laboratories, Inc.	2200	2200		10	20	4/73	9,900	4,280	14,180	3,000
	2200 VP	2200 VP		15	20	9/76	) 750	) 320	) 1,070	1,100
	2200 MVP	2200 MVP		18	28	12/77	)	)	)	150
	2200 VS	2200 VS		47	80	10/77	15	5	20	100
Warrex Computer Corp.	Centurion I-A	CC-201		18	19	/77	51	0	51	60
	Centurion II-A	CC-202		27	30	/75	76	0	76	70
	Centurion III	CC-203		36	36	/74	324	0	324	200
	Centurion IV	CC-204		43	43	/75	53	0	53	60
Wintex Computer Corp.	200 NS	Wintex		12		1/75	NA	NA	NA	NA
TOTAL							48,246	21,652	69,898	

Notes:
a) Includes installations of Eldorado 140.
b) Basic/Four Corporation computer models used Microdata processors until November, 1976.
c) Digital Computer Controls was acquired by Data General in early 1977.
d) Design Data was acquired by Data General in February, 1977.
e) Marketed in the United States by Shasta General Systems.
*) Not currently active in manufacturing or marketing small business computer systems.
NA) Data is not available.
X) Indicates SBC models not in new production.

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• AS SPRING ARRIVED . . . NEW COMPANIES AND NEW PRODUCTS BURST OUT ALL OVER. With a familiar name but a new product line, Royden C. Sanders Jr. formed R.C. Sanders Technology Systems, Inc., Derry, N.H. The product is a matrix printer that can reproduce images and signatures. At low speed, the Media 12/7's type quality reportedly can top that of electric typewriters; top speed is 216 cps.

A group from Magnetic Peripherals, Inc. has founded Magnex Corp. specializing in thin film magnetic recording heads for disk and tape drives. With backing from Exxon, the group expects to have prototypes by first quarter, 1979. Magnex intends to produce heads that handle storage densities of more than 100M bits/sq. in. Now, ferrite technology is unlikely to support more than 10M bpsi says Dr. Fred S. Lee, president. So Magnex will use a magneto-resistive read element and an inductive write element.

Functional Automation, Nashua, N.H., introduced a 64-bit processor, the F6400, designed to manipulate, store, and retrieve large volumes of data from main memory. The company's philosophy is to provide large memory so users don't have to be software whizzes to make efficient use of the system. The memory is associated with I/O units; at present, a memory I/O (MI/O) comes with 256K, but that is expected to grow to 2M bytes by the late 1980s as semiconductor densities increase. Prices start at $110,000 for the host CPU, two MI/Os, a 65M-byte disk with another 256K-M/IO linked, and a color terminal. Software consists of PL 1/G and the library will be expanded. By hanging several MI/Os onto the system, there could be 24Mbytes total, a spokesman says. With main memory rather than disks, the I/O rate can be considerably faster than on other disk based systems, he says. Ultimately, circa 1984, Functional hopes to provide machines that can be useful to non-computer people. The founder and president, Richard E. Moreley, has started other ventures, as has at least one of his staff. Moreley was in on the ground floor of Termiflex, of which he was a designer, and he started Modicon as well. Funding comes from a group of venture capitalists and unspecified international firms and banks.

And then there is Two Pi and its 32-bit mini version of a 370/138. Two Pi, with backing from U.S. Philips Corp., has signed up NCSS as an OEM account (EDP/IR,Apr.21,1978).

• FROM THOSE NOT-SO-NEW COMPANIES COME SOME NEW SYSTEMS. Sperry Univac topped off its 90 series with the 90/80-4, the only Series 90 with cache memory -- and nearly 32K at that. Main memory is 8M bytes, double that of the 90/80-3, which can be field upgraded to a -4. The -4's processing power exceeds that of the IBM 3031, Univac claims. A 2M-byte system with console, five channels, and cache is $1.26 million; memory is $319,300 for 2Mbytes.

Electronic Associates, Inc., added Hyshare, an EAI 3200 digital computer and up to six analog processors, to its line of hybrid systems. The unit can function as a digital, analog, and hybrid system at the same time.

Digital Scientific Corp. has begun a new line, the Meta 4/5000 Series, intended to cover the range from the upper end of the OEM market to the mid-370 territory that requires high timesharing throughput. The 5020 has twice the thruput of the 4/4000; typical system cost is $73,600.

Harris Computer Systems added the S123 entry level system to its S100 line, with prices starting at $120,000 for 144Kbytes of main memory, 40Mbyte disk, tape drive, 300 lpm printer, and communications capabilities. The S123 expands to 384Kbytes and uses the Vulcan operating system.

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• BURROUGHS LET GO WITH A ONE, TWO, THREE PUNCH recently, adding systems from small to large in the B2800, 3800, 4800, and 6800 series as well as a bunch of transaction peripherals and controllers. At the high systems end, the four new 6800s use 16K chips in both main and Global memory. With new micrologic in the CPU and the faster memory, Burroughs claims performance improvements ranging up to 40% over earlier B6800s and plans to produce more than twice as many 6800s in 1978 as in 1977. The new models can be configured with up to four CPUs and four I/O processors. Prices range from $425,000 to $1.4 million. At the same time, prices were slashed about 18% on older B6800s while lease rates were increased slightly. For those into data communications, the B6360 data communications subsystem for the new 6800s, with 24K and eight communications lines, costs $50,000. For the medium system users, there are five models that integrate the Data Link processors and I/O controls into the central system, thus improving the efficiency of the CPU. The new systems are object code compatible with the previous ones and also have a bundle of new systems software, such as RPG, as well as on-line entry and message control systems. More memory is available on some of the systems. Prices start at $100,000 for an entry level B2805 and range to $390,000 for the B4885, which starts with 500,000 bytes.

Just to make sure that its large base in the banking community stays content, it unveiled "modular transaction control systems" that can also find uses in hospitals, school systems, warehouses, wherever . . . giving NCR fair warning. Among the goodies are two printers, AP 100 and AP 300, TD 500 input and display systems, and DC 128/129 systems and communications processors. The AP 300 can print in various sizes and styles and sells for $1,700. The AP 100, at $5,150, features forms handling capabilities of the TU 1800 teller terminals. The DC 128/129 are independent processors that function as local control centers for the new gear as well as other terminals and displays in a local net. Prices start at $5,150. The TD 500 is a series of mix and match items such as 5- and 9-in. CRTs, keyboards, personal identification number keyboard, and mag card reader.

• LOTS OF TALK ON THE STANDARDS FRONT is expected as Ansi X3 forms three new committees, investigates forming a fourth. X3H1-OSCRL will work on a standard operating system command and response language in coordination with IFIP WG 2.7 on operating system interfaces. X3J6 is responsible for computer language for processing of text; chairman is Charles D. Card of Univac. The language is intended to be used to express the manipulation of text rather than as a hardware language. X3H2-DDL will work on a data description language for data base management systems; John Knutson of Univac, heading this effort, is looking for participants. A group known as X3/SPARC/MICRO will study the feasibility of standards on microprocessors; directing this effort is Donald Feinberg of DEC.

• FOREIGN DISTRIBUTORS SEEM HUNGRY for products. Facit Data Products will sell and service Dataroyal, Inc.'s IPS-7000(R) series of intelligent printers in Europe. Diablo Systems has signed on Geveke Elektronik, a subsidiary of SHV, a Dutch trading company, to market its Model 3200 small business computer in Europe. This five-year contract calls for delivery of 3,600 units with an if-sold value of $80 million. None other than ITT will become a European distributor of Apple Computer Corp.'s personal computers. Apple and ITT have drafted an agreement that gives ITT exclusive European manufacturing rights, nonexclusive marketing rights. In addition, the two companies will have a mutual cross-licensing agreement to exchange applications software, and ITT will buy a sizeable quantity from Apple until it activates manufacturing facilities.

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Review and Forecast

EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" APRIL 22, 1977 • VOL.12,NO.19&20 P.J.McGOVERN, PUB.

Springboard year

COMPUTER SHIPMENTS HIT $13 BILLION; NEW PRICE/PERFORMANCE CURVES FASHIONED

Starting off almost glassy calm -- yet with user spending plans and vendor product enhancements portending later excitement -- 1976 turned out to be a year of fundamentals, of building. And judging from the IBM-laden events of the last several months, it was the springboard for what looks to be a raucous 1977.

Perhaps the single biggest development in 1976 was IBM's introduction of two new 370s . . . and new price/performance curves to go with them. But in a year which saw computer shipments nudge $13 billion, services revenues reach $5 billion, and spending on data communications top $2.5 billion, noteworthy events were thick and varied:

- New mainframer product lines appeared, older ones got revamped and repriced. General-purpose computer shipments hit $10.5 billion worldwide.
- In data communications, the mainframers announced or enhanced their network architectures . . . while AT&T sparked controversy with its "Bell Bill" and tariffing of the Dataspeed 40/4.
- IBM settled with Telex and won against CalComp in antitrust suits. Meanwhile, the IBM-U.S. trial set new standards for slowness.
- Subindustries prospered. Minimaker revenues jumped 36%, U.S. general-purpose terminals and data entry devices hit $8 billion installed.
- Plug-compatible CPUs arrived; IBM's reactions began rippling through the add-on memory, third-party leasing, used computer, and other businesses.

The basic trends remain . . . data base management, on-line applications, distributed processing, increasing user sophistication, etc. But EDP/IR detects another trend in more recent events . . . increased aggressiveness and competitive pressure from IBM. Whether as a result of its courtroom successes or simply the economics of semiconductor production, the Giant's latest price cuts and performance increases will have a wide-ranging impact on the whole industry.

Upshot: The mainstream computer business looks ready to roll off its three-year shipment plateau . . . possibly sparking the separate pricing of software.

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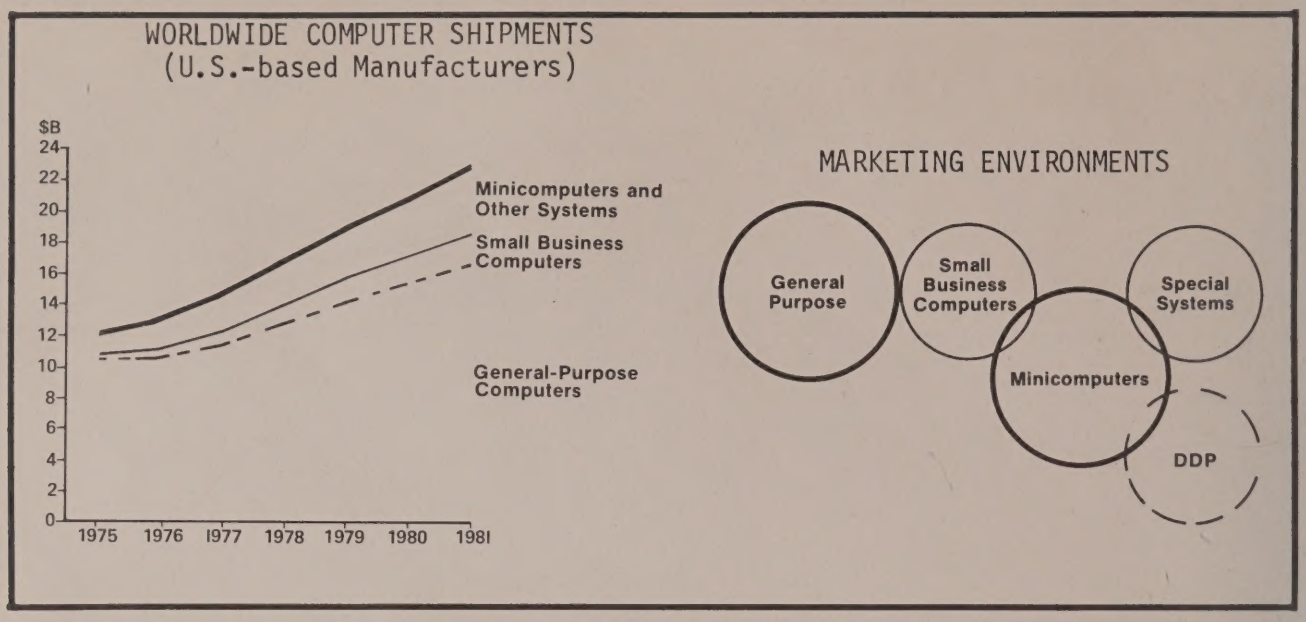

A new look at the computer market

EDP/IR and publisher IDC have traditionally split the installed base of computers into two camps . . . general-purpose (Group A) and dedicated application (Group B) computers, the latter consisting primarily of minicomputers. But definitions in an ever-changing industry tend to get hidebound, so this year the base has been broken into more meaningful divisions. Details -- including model-by-model censuses -- are presented in this issue. But basically, IDC distinguishes:

- General-purpose computers are the "bread-and-butter" commercial systems from IBM and the other majors. This category consists of the old general-purpose Group A computers, Size Classes 2 through 7.

- Small business computers cater to the first-time commercial user and include all of the old Size Class 1. Examples: System/32, Burroughs B 80, DEC Datasystem 300/500, Basic/Four.

- Minicomputers are those processors made by DEC, Data General, etc. that cater to OEMs, sophisticated large users, and dedicated-application markets.

- Other computers/processors are systems -- many just beginning to emerge -- that don't fit other categories. These include intelligent terminals operating standalone, clustered terminal systems, etc.

The relationships between the divisions of the installed base are shown in the chart above. It is important to note that minicomputers overlap the other segments . . . thus, care must be exercised in comparing charts or figures and forecasts from previous issues of the EDP/IR.

In 1976, general-purpose computers accounted for $5.23 billion worth of shipments in the U.S., $5.29 billion overseas. Small business computers will tally $415 million worth of U.S. shipments, $205 million overseas. Minicomputers and other systems will pass $1.2 billion in U.S. shipments, $565 million overseas. By 1981, general-purpose computer, small business computer, and minicomputer and other system shipments will grow by factors of 1.6, 3.0, and 2.5 respectively.

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WORLDWIDE GENERAL-PURPOSE COMPUTER MARKET FOR U.S.-BASED MANUFACTURERS
(Copyright 1977 by International Data Corporation)

	1976 Shipments:		In Use Yearend 1976:		
	$M	% Total	$B	% Total	1975-76 Change
IBM	7,200	66.1%			
Plug-Compat.	650	6.0			
Amdahl	115	1.1			
IBM Systems	7,965	73.2%	47.9	70.6%	+ 11.2%
Sperry Univac	790	7.3%	5.3	7.8%	+ 12.1%
Burroughs	700	6.4	4.0	5.9	+ 16.5
HIS	680*	6.2	5.3	7.8	+ 7.0
NCR	340	3.1	1.6	2.3	+ 9.0
CDC	265	2.6	2.4	3.5	+ 8.6
DEC	135+	1.2	.5	.7	+ 43.0
Cray	10	-	-	-	-
SUBTOTAL	2,920	26.8	20.0	29.4	+ 11.1
TOTAL	$10,885*+	100.0	67.9	100.0	+ 11.2%

* Does not include over $100 million in HIS minicomputer revenues
\+ Does not include over $700 million in DEC minicomputer revenues

*+ Total includes $370M in small business computers.

GENERAL-PURPOSE SHIPMENTS LEVEL FOR 1976, FORECAST TO RISE IN 1977
WORLDWIDE INSTALLED BASE EXPECTED TO HIT $100 BILLION BY 1981

New-built shipments of U.S.-made general-purpose computers hit $10.5 billion last year, up only 1% from 1975's $10.4 million and down 2% from 1974's record of $10.7 billion. But, on the strength of IBM's new midrange 370s and their competitive rivals, shipments are expected to rise 8.4% this year to $11.4 billion. 1978 and 1979 are expected to show over-10% rates; shipments at the turn of the decade are expected to slow to an 8% annual growth rate.

On the international scene, the two-year trend of overseas computer shipments growing faster than domestic shipments is expected to reverse this year. In fact, 1976 is expected to be the only year this decade in which overseas shipments surpass U.S. shipments on a dollar value.

Furthermore, the net add to the installed base as a ratio of shipments is increasing in the U.S. and beginning to flatten overseas -- providing the worldwide base about 10% growth per year through 1980. Beginning with 1976, the overseas installed base will grow about as fast as the U.S. base.

Behind these shipment patterns lie several trends affecting the long-term and short-term outlook for the general-purpose computer market:

- Users are ready for new hardware. IDC surveys show the average medium/large-scale IBM site using its computer 15 out of 21 shifts a week. New price/performance levels should add to acquisition incentive.

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COMPUTER MARKET SUMMARY -- U.S.-BASED MANUFACTURERS

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	69,300	263,000	$ 11,920	$ 58.5
1975	75,700	327,200	12,050	67.1
1976	96,150	403,400	$ 12,810	$ 75.9
1977	121,500	507,500	$ 14,510	$ 85.7
1978	149,200	635,500	16,790	96.8
1979	177,000	789,500	19,100	109.3
1980	210,800	972,400	21,260	123.2
1981	245,600	1,180,600	$ 23,610	$ 138.6
		UNITED STATES		
1974	47,500	179,900	$ 7,040	$ 33.6
1975	50,800	220,200	6,480	38.0
1976	65,900	270,600	$ 6,710	$ 42.9
1977	83,950	336,800	$ 8,060	$ 48.4
1978	103,300	418,500	9,520	54.7
1979	121,800	513,800	10,960	61.7
1980	146,200	627,000	12,340	69.6
1981	171,800	755,000	$ 13,770	$ 78.2
		INTERNATIONAL		
1974	21,800	83,100	$ 4,880	$ 24.9
1975	24,900	107,000	5,570	29.1
1976	30,250	132,800	$ 6,100	$ 33.0
1977	37,550	170,700	$ 6,450	$ 37.3
1978	45,900	217,000	7,270	42.1
1979	55,200	275,700	8,140	47.6
1980	64,600	345,400	8,920	53.6
1981	73,800	425,600	$ 9,840	$ 60.4

This is the total of all general-purpose computers, minis, small business computers (SBCs), and "other" systems such as IBM's S/7. Efforts have been made to eliminate double counting (e.g., minis used in SBCs). Details on the three major types of computers are found in tables elsewhere in this issue. Note that the general-purpose and SBC tables are mutually exclusive, but the minicomputer table includes computers subsequently shipped to users -- by the minimakers themselves or by systems houses -- as small business computers.

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- New rounds of applications are ready for implementation. Data base management systems, on-line processing, telecommunications hookups -- all are adding to the demand for more systems/capacity.

- The international market is maturing. Retirements are beginning to whittle the net add/shipment ratio toward that of the U.S. By size class, the overseas distribution of installed base is similar to the domestic base -- with a slight bulge in the medium-scale systems.

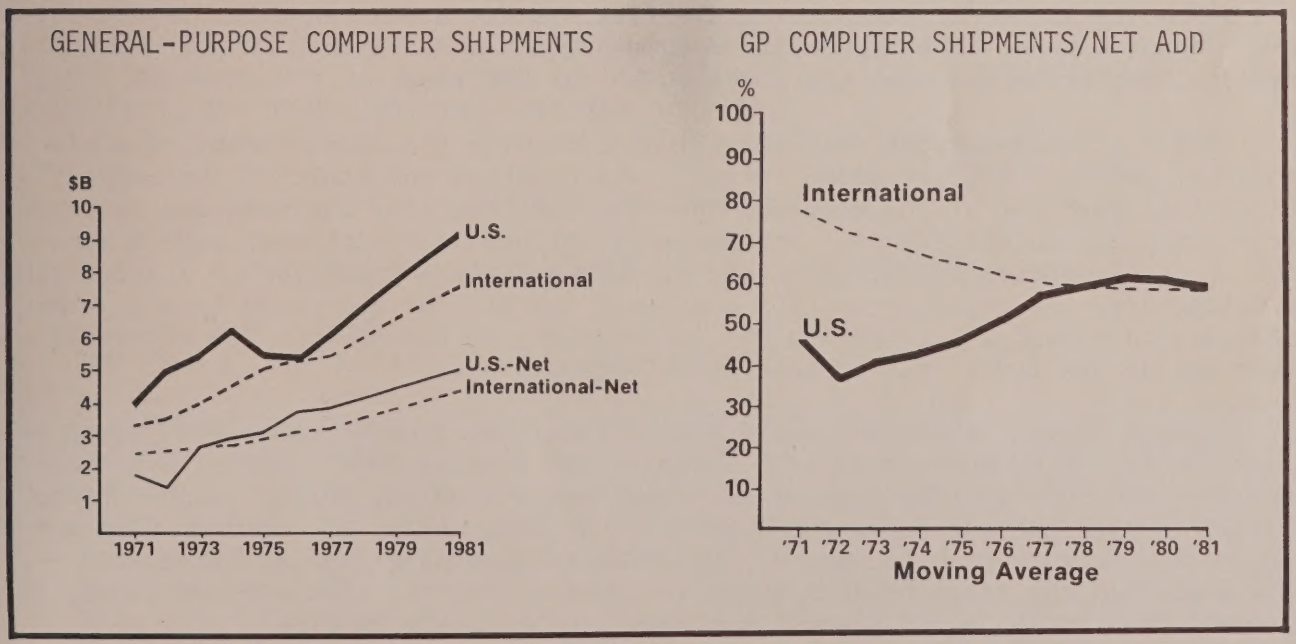
- Equipment rental is waning in popularity. In 1976 rental accounted for only 37% of all U.S. computer acquisitions, purchase accounted for 40%. The international mix was higher -- 60% rental -- but dropping.

While some of the trends are generic, representing the increasing sophistication of users and the penetration of information processing into all aspects of our daily lives . . . some are influenced by vendor policy, primarily IBM's. For the last several years IBM has been repricing its equipment -- and competitors have been responding -- to encourage purchase and lease . . . either to clear the shelves for a new round of computers, or to nudge the industry toward a capital goods orientation. The latter would allow more frequent insertions of technology into product lines . . . and probably mandate unbundling.

Mainframer review

If 1976 was a year of building for the industry, perhaps nowhere was it as apparent as in the market for general-purpose computers. With slower-rolling product cycles than other segments of the EDP industry, it's significant that no less than three new product lines were established (counting IBM's 138 and 148 as part of a new line). Moreover, a whole new concept in computer systems -- the plug-compatible CPU -- was brought to fruition. A rundown of major events:

Burroughs introduced its new "800" Series of computers, including the B 800, 1800, 2800, 3800, 4800, and highly-modular 6800. More recently, the company introduced the behemoth 7800 and "Burroughs Scientific Processor," what the Detroit mainframer calls the first "total system" in the super computer class. Besides



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introducing the models, Burroughs also repriced them during the year . . . in response, most observers say, to IBM actions. Burroughs also introduced its B 80 small business computer. . . . and continued to show higher-than-average profit margins and customer loyalty.

Control Data, though garnering more and more of its revenues from computer services, rekindled its mainframe flame with the introduction of a new super computer -- the Star 100 -- and two new Cyber 170s unveiled this month. (The Cyber 171 is said to be comparable to a 370/148; the Cyber 176 is said to be 3-4 times as powerful as a 168.) Thanks to its computer services business and acceptance of the Cyber 170s, CDC's earnings picture is brighter than it's been for years.

DEC strengthened its bid for general-purpose mainframe revenues by making its timesharing/networking prowess available to a wider array of users with the DECsystem-20 (Model 2040), a smaller version of the DECsystem-10. DEC also enhanced the batch processing capabilities of its systems, and later announced a new top of the line (Model 1090) and bigger DECsystem-20 (Model 2050).

Honeywell had a big year . . . beefing up its Series 60 with memory and performance enhancements, enhancing its Level 6 minis and incorporating them in other other EDP products, unveiling a new top of the line (66/85), and announcing its "Distributed Systems Environment" answer to IBM's SNA. Like others, however, HIS found itself adjusting prices when IBM announced the 138/148. The company also restructured its domestic operations and began melding the Xerox and CII product lines into its own. Honeywell's other business -- industrial controls -- also did well . . . thanks to the cold winter and new energy conservation "consciousness."

IBM dominated the news last year, making major announcements on virtually all fronts. The most impressive, of course, were the new 370s -- the 138, 148, 3033, and 158 and 168 Attached Processors. But perhaps even more stunning in the long run are the series of memory price cuts -- the latest occurred just last week -- that have brought the price of memory in DPD products to 11¢ a byte, in GSD gear even lower. Other announcements were also instrumental in fleshing out an environment for the next round of major products . . . networking enhancements to SNA, more MVS software, and partial unbundling of the operating system and utilities. And IBM moves in the minicomputer and office systems arena leave little doubt that the company intends to maintain its double-digit revenue growth in part by culling dollars from areas not strictly confined to the EDP room.

NCR's general-purpose computer thrust came with the announcement of a new computer family, the "Criterion" Series, which marked the start of the company's first full year out of the electromechanical cash register business and reaffirmed its commitment to mainframes. Announcements planned for next week should expand the currently-sparse product line and establish NCR's posture toward a networking architecture. In other areas, NCR continued its bid for supremacy in the auto-transaction market . . . copping the lion's share of business in POS terminals and introducing the first "second generation" POS system.

Sperry Univac, while not quite announcing a new line of computers, added to both the Series 90 and Series 1100 sides of its product family with the 90/80, 1100/80, and 90/25. (The company also repriced the 90/60, 90/70, and memory on the 90/80 when IBM announced the 138/148.) Significantly, the company also put a tag on its network architecture -- "Distributed Communications Architecture" -- and announced the first product under its aegis, TELCON. Last but not least, the company finally announced a small business computer, the BC 7.

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IBM ON THE RAMPAGE? . . .

. . . is what some of IBM competitors might well be asking these days. Look at the record. Last May the Giant cut memory purchase prices on its 370s by 30%, running the price down to $170,000 per megabyte. In July the 138 and 148 were announced -- at the lower price/byte memory and with lower CPU prices than their predecessors -- and eight months later memory prices on the 158 and 168 were lowered again, to $110,000 per megabyte. Purchase prices were also lowered on the CPUs and the 3033 was announced . . . with more performance at less cost than a 168-3.

Two weeks later IBM lowered 115 and 125 rental, lease, and purchase prices by 20%; 135 and 145 purchase prices by 20% and main memory increments by 35%. Purchase prices on 3330 and 3333 disk systems were lowered 15%.

If that's not enough, just before announcing the System/34 and new software for the Series/1, IBM's GSD lowered most of its prices . . . until now one version of the Series/1 comes with memory increments priced at 7.4¢ a byte.

Observers divide into three camps . . . those that see IBM's actions as a "fire sale" to get the user base ready for new CPUs, those that see IBM's actions as part of a "stop Amdahl" operation, and those that go both ways. In fact, though, the biggest immediate impact may be on used computer dealers and third-party lessors . . . as residual values for older 370s drop. Add-on memory makers will also have a smaller price umbrella under which to operate, but some claim that the lower residual values will work to their advantage . . . as resale value becomes less a factor in user acquisition decisions.

What it points to is unbundling (and back around to the plug-compatible CPU vendors?). As software emerges from the blanket of total system pricing, the technological edge held by hardware-only vendors wanes. With software paying its own way and less of a rental base to protect, IBM should be able to compete chip for chip with other mainframers, PCMs, semiconductor houses, and foreign competitors. A diffused IBM, in fact, would be an awesome competitor.

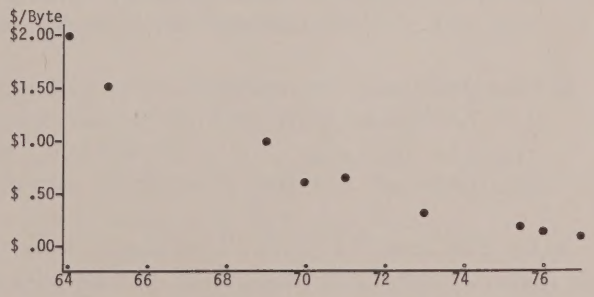
Meanwhile as the industry moves toward a capital goods orientation, IBM extends its tentacles in a variety of directions . . . data communications, minicomputers, and soon, perhaps, computer services.

\+ + + +

IBM MEMORY PRICE HISTORY

Model	Date	$/Byte
360/30	1964	$2.00
360/65	1965	1.50
S/3-10	1969	1.00
370/155	1970	.60
370/135	1971	.64
370/115	1973	.30
5100	9/75	.18
158/168 cut	5/76	.17
Series/1	11/76	.12
3033	3/77	.11
Series/1 cut	4/77	.07

Memory Curve



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Plug-compatible computers

The PCM computer makers are in a category by themselves. Amdahl announced its 470V6 in the fall of 1975 and proved at least the short term viability of the concept by operating the first year in the black and placing 33 systems by yearend 1976. Itel got into the act last October with two midrange systems aimed at IBM's 145, 148, and 158 base. And there may be more to come: IPL Systems has shipped two production models of a 145/148-size plug-compatible CPU to Control Data.

More significant than their initial announcements will be the PCM-CPU makers' ability to withstand IBM's reactions. Amdahl and Itel both claim to have foreseen the introduction of such systems as the 158 and 168 Attached Processors and the new 3033. Though the severity of IBM's recent memory and CPU price cuts may have surprised them a bit, some sort of move by IBM was widely predicted. Since then:

- Amdahl announced a new version of its V6 and two new models that bracket it in the line. With the new models Amdahl keeps the same price/performance relationship with IBM's repriced products it had before the IBM price cuts. Fully-configured V6 and V5 CPUs cost about the same as their IBM equivalents -- but without power supply, console, and channels -- while the V7 dwarfs anything in IBM's uniprocessor line.

- Itel, which claims to be ready for a 370/158 replacement later this year, has not repriced its systems . . . but is rumored to be readying a smaller system (145-size?) to expand its line.

The price performance curve

With the 138/148, IBM ushered in a new level of "bang for the buck," knocking CPU and memory prices below predecessors of lesser performance. When the 370 replaced the 360, users were offered 60% more power and double the memory for 25% more money, 3.5 times the power and four times the memory for 2.25 times as much. But with the 138/148, upgrading users can get 30% more power and double the memory for 25% less money, while 2.5 times the power and quadruple the memory costs only 60% more. These new price performance levels have resulted in:

- Accelerated midrange computer acquisitions. IDC pre-138/148 surveys of user migration plans showed 85%-90% of 135 and 145 users had no plans in 1976 to change CPUs. Now about 50% want to make a switch. (In fact, backlog and interest in the 138/148 run so high that a market now exists in "futures" . . . or position in the delivery queue.)

- Lower prices from competitors. Univac and Burroughs, for instance, repriced their lines within weeks of IBM's announcement. Products yet to be announced -- mainframes, add-on memory, etc. -- will have to take IBM's new price "standards" into account.

- New pressure to unbundle. Systems manufacturers will be encouraged to let hardware prices follow semiconductor costs and software begin paying its own way . . . incentive, perhaps, for IBM to continue selling "solutions" on the one hand, start selling OEM equipment on the other.

With the new "eights," cheaper memory, and marked-down 370s now on the block, users have fresh motivation to prime the IBM pump -- as shipment forecasts show. For some that's good news, for others it may mean pruning profit margins.

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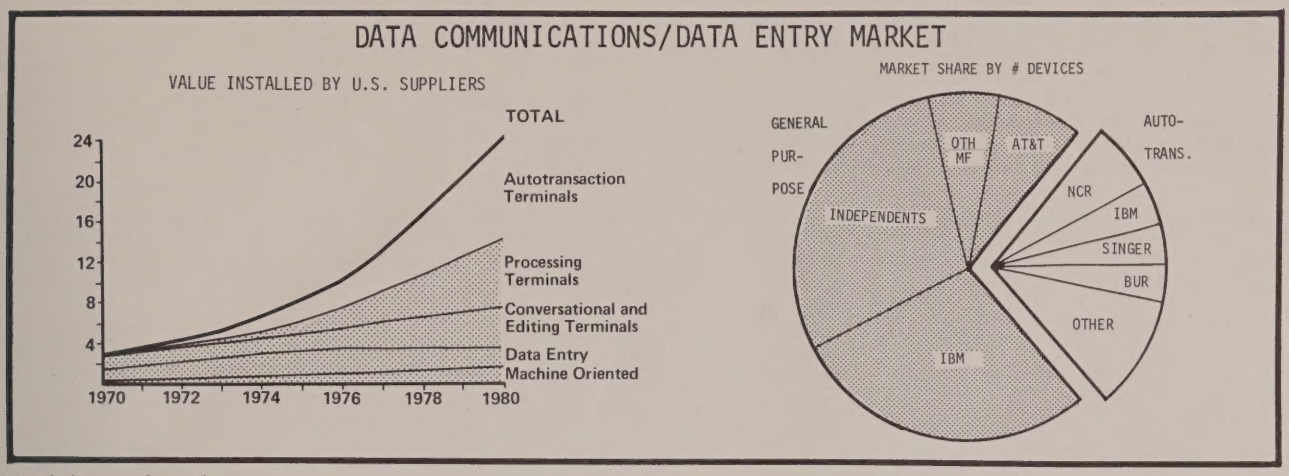

Looking ahead

Other winds blow across the computer industry . . . and as communications and computing technologies and markets converge, users are changing the way they use computers, and these changes are being translated into the marketplace:

- General-purpose datacomm terminals/data entry devices will show cumulative U.S. shipments of $9 billion in the next five years. As of 12/76, IDC counted 1,300,000 devices in the U.S. worth $8 billion.

- Another $2 billion -- 500,000 devices -- of autotransaction devices (automated teller machines, retail POS terminals, etc.) were in place as of yearend with a 40% annual growth rate forecast for the next 5 years.

- Spending for data communications hardware, up 38% in 1976, was over $900 million last year in the U.S.; spending on communications line charges was $1.7 billion, up 22% from the year before.

Despite such attractive growth rates for datacomm products and services, the market is still cloudy . . . primarily because of the confusion caused as a regulated industry collides with an unregulated one. By 1981, however -- after the FCC's second Computer Inquiry and perhaps a Congressional rewrite of the communications laws -- some of these clouds may dissipate. By then IBM's SBS subsidiary should be operating and its Systems Network Architecture well-defined . . . as will be competing services and products from the other giant, AT&T.

Meanwhile, as computers land in networks, processing power gets distributed, and semiconductor production economies continue their relentless pressure on hardware costs, certain trends are bound to affect the computer industry as a whole:

- Storage costs will drop and new devices made available; equipment geared for on-line or application-unique use will prosper.

- New products, services, and pricing schemes will come into existence, perhaps through unbundling or the offering of hybrid services.

- Outside forces -- courts, legislators, consumer opinion -- will exert even more pressure on an industry used to going its own way.

Prognosis for the general-purpose computer market and its suppliers: a typically hectic, confusing, but bullish closeout of the decade.

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GENERAL-PURPOSE COMPUTER CENSUS

Counts in the General-Purpose Computer Census are based on the best information available to IDC -- but are estimates nevertheless. Computer makers, as a rule, do not directly supply this type of data. General-purpose computers -- as characterized by IBM's 370 family and competitors -- comprise the bulk of digital computers by value. They are primarily byte or character oriented and programmed in higher-level language.

Size classes are based on IBM 370s -- instead of constantly shifting average system values -- and which of a of a maker's models competes with which IBM machine, e.g. a computer in Size Class 7 would compete with an IBM 168 or 165. (Other classes can be checked under IBM's column.) Size Class 1 computers have been deleted from this census and included in the SBC Census. An "x" in the last column means not on order from the original manufacturer.

AS OF JANUARY 1, 1977

NAME OF MANUFACTURER	CLASS	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Amdahl	7	470 V/6	$108,000	6/75	26	7	33	50
Burroughs	3	B-200		11/61				X
	3	B-300	$ 6,500	7/65	525	350	875	X
	3	B-500		11/68				X
	2	B-70X/71X	$ 1,450	3/73	1,650	725	2,375	1,500
	2	B-72X/73X		4/75				
	2	B-1712/14/16/18	$ 2,500	8/72	1,060	625	1,685	
	2	B-1710 Series		12/75				500
	3	B-1776/26/28	$ 7,100	2/73	350	155	505	
	3	B-1800	$ 6,400	5/77	0	0	0	
	4	B-2500	$ 9,700	2/67	74	90	164	X
	4	B-2700	$ 9,700	8/72	355	165	520	X
	4	B-2800	$ 15,000	1/77	0	0	0	100
	4	B-3500	$ 17,700	5/67	410	310	720	X
	4	B-3700	$ 25,000	11/72	300	210	510	X
	4	B-3800	$ 19,000	1/77	0	0	0	150
	5	B-45/4700	$ 29,500	10/71	325	120	445	X
	5	B-4800	$ 35,000	9/76	5	5	10	75
	5	B-5500	$ 35,000	3/63	52	17	69	X
	5	B-5700	$ 32,000	12/70	15	10	25	X
	6	B-6700	$ 63,000	11/69	125	95	220	X
	6	B-6800	$ 46,500	3/77	0	0	0	75
	7	B-7700	$136,000	8/73	23	4	27	10
		Totals			5,269	2,881	8,150	2,410
CDC	4	Cyber-71	$ 19,800	7/76	1	2	3	10
	4	G-20	$ 19,600	4/61	3	-	3	X
	6	1604/A/B	$ 42,000	1/60	10	-	10	X
	4	31/3150	$ 9,800	12/64	51	30	81	X
	5	3170	$ 21,500	12/70	12	14	26	X
	4	3200	$ 14,700	5/64	34	29	63	X
	5	3300	$ 33,000	9/65	93	74	167	X
	5	3400	$ 23,700	11/64	3	4	7	X
	5	3500	$ 30,000	1/69	19	15	34	X
	6	3600	$ 49,000	6/63	15	15	30	X
	6	3800	$ 57,000	12/65	14	2	16	X
	6	6200	$ 42,000	11/70	-	4	4	X
	5	Cyber-72	$ 39,000	10/71	27	67	94	X
	6	Cyber-172	$ 46,000	7/75	5	34	39	30
	6	6400	$ 60,000	5/66	52	51	103	X
	6	Cyber-73	$ 56,000	3/72	28	50	78	X
	6	Cyber-173	$ 75,000	9/75	4	27	31	35
	6	6500	$ 82,000	12/67	17	15	32	X
	7	6600	$120,000	8/64	51	30	81	X
	7	Cyber-74	$130,000	3/72	12	11	23	X
	6	Cyber-174	$ 87,000	9/75	4	1	5	5
	7	Cyber-175	$150,000	8/75	2	2	4	5
	7	Cyber-76	$178,000	3/72	4	8	12	2
	7	7600	$185,000	1/69	22	9	31	X
	7	6700	$135,000	7/70	2	-	2	X
	7	Star-100	$270,000	12/74	4	-	4	0
		Totals			489	494	983	87
DEC	4	2040	$ 10,000	6/76	25	33	58	200
	4	2050	$ 18,800	1/77	-	-	-	
	4	PDP-6	$ 10,000	10/64	7	4	11	X
	4	1040/50/55	$ 16,200	10/67	185	150	335	X
	5	1060/70/77	$ 18,400	6/72	110	85	195	50
	6	1080/88/90	$ 26,500	6/75	40	20	60	40
		Totals			367	292	659	290
Honeywell	2	G-5X Series	$ 1,750	8/70	305	1,490	1,795	X
	3	G-100 Series	$ 4,700	4/66	110	960	1,070	X
	4	G-200 Series	$ 10,000	4/61	130	31	161	X
	4	G-400 Series	$ 16,000	5/64	200	250	450	X
	6	G-615/25/35/45	$ 78,000	4/65	42	31	73	X
	5	G-6025	$ 30,000	11/73	33	30	63	X
	5	G-6030/40	$ 40,500	6/71	57	135	192	X
	6	G-6050/60	$ 66,000	7/71	115	65	180	X
	6	G-6070/80	$103,000	7/71	45	26	71	X
	7	G-6180	$103,000	2/74	2	0	2	X
	2	Gamma 10	$ 2,500	7/64	-	850	850	X
	4	Gamma 30	$ 10,000	2/62	-	81	81	X
		G-Subtotals			1,039	3,949	4,988	X
	3	H-105/115	$ 6,200	3/70	380	330	710	X
	3	H-110/120	$ 5,100	1/66	155	145	300	X
	4	H-125	$ 8,300	12/67	28	165	193	X
	3	H-200	$ 7,500	3/64	305	150	455	X
	3	H-2020	$ 3,600	2/73	560	145	705	X
	3	H-2030	$ 5,700	1/73	125	58	183	X
	4	H-2040	$ 12,400	4/72	295	135	430	X
	4	H-1015	$ 13,900	4/71	34	28	62	X
	4	H-2050	$ 18,700	4/72	135	105	240	X
	4	H-12/1250	$ 14,000	2/66	260	105	365	X
	4	H-2015	$ 20,500	2/71	44	35	79	X
	4	H-2060	$ 19,500	4/72	49	24	73	X
	4	H-2200	$ 19,000	1/66	110	38	148	X
	5	H-2070	$ 32,500	5/72	48	2	50	X
	5	H-3200	$ 27,000	2/70	100	33	133	X
	5	H-4200	$ 44,000	9/68	14	2	16	X
	6	H-8200	$ 71,000	2/69	14	5	19	X
	4	H-4/1400	$ 14,000	12/61	12	17	29	X
	5	H-8/1800	$ 35,000	12/60	20	13	33	X
		H-Subtotals			2,688	1,535	4,223	X
	2	H-61/58	$ 2,100	6/74	79	560	639	600
	2	61/60	$ 3,100	6/74	57	610	667	
	3	62/40	$ 4,100	10/74	130	125	255	250
	3	62/60	$ 5,300	10/74	53	125	178	
	4	64/20	$ 9,200	10/74	82	210	292	175
	4	64/40	$ 13,200	10/74	16	63	79	
	4	66/05	$ 16,300	10/76	2	3	5	30
	4	66/07	$ 19,100	3/77	-	-	-	
	5	66/10	$ 25,500	6/75	24	25	49	50
	5	66/17	$ 25,500	2/77	-	-	-	
	5	66/20	$ 36,000	11/74	59	85	144	50
	5	66/27	$ 35,000	3/77	-	-	-	
	6	66/40	$ 60,000	10/74	18	33	51	20
	6	66/60	$ 85,000	10/74	25	11	36	
	7	66/80	$107,000	10/74	11	3	14	25
	7	68/80	$ 95,000	10/74	2	-	2	
		S-60 Subtotals			558	1,853	2,411	1,200
		HIS Totals			4,285	7,337	11,622	1,200

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IBM	2	System/3-4	$ 1,250	6/76	150	20	170	300
	2	System/3-6	$ 1,700	12/70	1,750	1,270	3,020	X
	2	System/3-8	$ 2,100	6/75	3,800	3,100	6,900	2,000
	2	System/3-10	$ 2,500	1/70	12,250	7,350	19,600	X
	3	System/3-12	$ 3,600	3/76	2,230	950	3,180	3,000
	3	System/3-15	$ 6,500	3/74	2,770	1,170	3,940	700
		Subtotals			22,950	13,860	36,810	6,000
	3	370/115	$ 8,400	4/74	1,320	2,300	3,620	100
	4	370/125	$ 12,000	6/73	1,290	2,170	3,460	X
	4	370/135	$ 19,100	5/72	2,460	2,850	5,310	X
	4	370/138	$ 19,400	11/76	30	20	50	2,250
	5	370/145	$ 36,500	7/71	1,820	1,690	3,510	X
	5	370/148	$ 35,500	3/77	-	-	-	1,500
	6	370/155	$ 67,000	2/71	530	415	945	X
	6	370/158	$ 95,000	5/73	1,280	1,150	2,430	350
	7	370/165	$123,000	6/71	120	63	183	X
	7	370/168	$177,000	7/73	415	240	655	150
	7	370/195	$260,000	3/71	14	4	18	X
		Subtotals			9,279	10,902	20,181	4,350
	3	360/20	$ 2,800	12/65	1,440	3,050	4,490	X
	3	360/22	$ 3,600	7/71	175	160	335	X
	3	360/25	$ 8,000	10/68	150	730	880	X
	4	360/30	$ 10,900	6/65	2,080	1,370	3,450	X
	4	360/44	$ 18,100	7/66	44	54	98	X
	4	360/40	$ 18,400	6/65	1,180	1,250	2,430	X
	5	360/50	$ 32,500	8/65	530	395	925	X
	6	360/65	$ 69,000	11/65	410	215	625	X
	7	360/67	$142,000	6/66	23	16	39	X
	7	360/75	$118,000	1/66	25	17	42	X
	7	360/85	$178,000	10/69	1	1	2	X
	7	360/9X	$191,000	11/67	12	5	17	X
		Subtotals			6,070	7,263	13,333	X
	2	1130	$ 2,500	2/66	1,700	1,490	3,190	X
	3	1401	$ 3,700	9/60	620	660	1,280	X
	2	1401-G	$ 2,400	5/64	20	15	35	X
	2	1401-H	$ 1,750	6/67	5	13	18	X
	4	1410	$ 17,100	11/61	52	39	91	X
	3	1440	$ 4,700	4/63	90	140	230	X
	4	1460	$ 10,000	10/63	19	20	39	X
	3	1620	$ 2,700	9/60	140	125	265	X
	5	7010	$ 25,500	10/63	6	3	9	X
	7	7030	$160,000	5/61	2	1	3	X
	5	7040/44	$ 30,000	6/63	13	20	33	X
	5	7070/74	$ 27,000	3/60	96	22	118	X
	6	7080	$ 60,000	8/61	32	-	32	X
	6	7090/94	$ 71,000	8/60	40	11	51	X
		Subtotals			2,835	2,559	5,394	X
		Totals			41,134	34,584	75,718	10,350
NCR	3	Criterion 8550	$ 9,700	4/76	40	15	55	300
	4	Criterion 8570	$ 15,200	5/76	5	1	6	100
	2	Century-50	$ 2,100	2/71	590	40	630	X
	3	Century-100	$ 3,100	9/68	460	740	1200	X
	2	Century-75	]	7/76	]	]	]	]
	3	Century-101	] $ 3,800	10/72	] 1,160	] 700	] 1,860	] 100
	3	Century-151	$ 4,800	2/75	275	75	350	150
	4	Century-200	$ 7,300	9/69	355	430	785	X
	4	Century-201	$ 10,500	8/74	285	105	390	X
	4	Century-251	$ 18,600	11/73	85	70	155	X
	5	Century-300	$ 24,000	2/72	90	75	165	20
	3	315	$ 3,400	5/62	110	165	275	X
	4	315-RMC	$ 10,300	9/65	19	20	39	X
		Totals			3,474	2,436	5,910	670
Singer	2	System 10	$ 2,600	10/70	1,650	1,250	2,900	X
Sperry-Univac	4	III	$ 27,000	8/62	88	33	121	X
	3	SS-80/90	$ 8,500	8/58	2	6	8	X
	4	418 I/II	$ 12,000	6/63	52	55	107	X
	4	418 III	$ 41,500	6/69	48	90	138	X
	5	491/492	$ 28,500	12/61	13	10	23	X
	6	494	$ 80,000	2/66	66	58	124	X
	2	1004	$ 1,100	2/63	335	335	670	X
	2	1005	$ 1,900	4/66	280	94	374	X
	3	1050	$ 9,300	9/63	135	85	220	X
	6	1106	$ 44,500	12/69	90	225	315	X
	6	1107	$ 60,000	10/62	5	11	16	X
	7	1108	$ 87,000	9/65	160	98	258	X
	7	1110	$138,000	6/72	60	77	137	X
	2	9200	$ 2,200	6/67	695	690	1,385	X
	3	9300	$ 4,800	9/67	580	500	1,080	X
	4	9400	] $ 11,800	5/69	] 240	] 435	] 675	X
	4	9480	]	3/73	]	]	]	X
	3	90/30	$ 5,600	2/75	345	570	915	600
	4	90/60	$ 19,500	1/74	75	80	155	60
	5	90/70 (+9700)	$ 23,500	11/73	11	31	42	X
	5	90/80	$ 56,000	2/77	-	-	-	5
	5	1100/10	$ 31,000	4/76	19	8	27	50
	5	1100/20	$ 29,000	4/75	6	22	28	25
	6	1100/40	$ 73,000	7/75	7	22	29	30
	7	1100/80	$ 83,000	3/77	-	0	-	10
		Subtotals			3,312	3,535	6,847	780
	4	301	$ 6,900	10/60	54	5	59	X
	5	501	$ 16,600	6/59	6	-	6	X
	5	3301	$ 23,500	7/64	49	-	49	X
	3	Spectra 70/15	$ 4,400	9/65	5	-	5	X
	3	Spectra 70/25	$ 7,800	9/65	1	1	2	X
	4	Spectra 70/35	$ 13,800	1/67	65	2	67	X
	5	Spectra 70/45	$ 25,500	11/65	205	9	214	X
	5	Spectra 70/46	$ 43,000	11/68	37	1	38	X
	5	Spectra 70/55	$ 40,500	11/68	6	-	6	X
	6	Spectra 70/60	$ 47,500	9/70	25	-	25	X
	6	Spectra 70/61	$ 52,000	3/71	4	-	4	X
	3	Spectra 1600	$ 4,000	1/69	34	-	34	X
	4	Spectra 70/2	$ 13,300	7/71	44	-	44	X
	4	Spectra 70/3	$ 21,600	10/71	17	-	17	X
	6	Spectra 70/6	$ 35,000	10/71	38	-	38	X
	6	Spectra 70/7	$ 42,000	10/71	23	-	23	X
		Subtotals-R			613	18	631	X
		Totals			3,925	3,553	7,478	780
Xerox	4	Sigma 5	$ 14,000	8/67	130	28	158	X
	4	Sigma 6	$ 22,500	11/70	37	13	50	X
	5	Sigma 7	$ 27,000	12/66	58	10	68	X
	4	Sigma 8	$ 20,500	9/71	6	7	13	X
	6	Sigma 9	$ 50,000	11/71	65	26	91	X
	3	530	$ 3,800	8/73	110	38	148	X
	4	550/560	$ 13,400	11/74	36	4	40	X
	5	940	$ 26,000	4/66	45	3	48	X
	3	9300	$ 8,500	11/64	20	5	25	X
		TOTALS			507	134	641	X
		TOTALS			61,126	52,968	114,094	15,837

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GENERAL-PURPOSE COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	16,400	111,800	$ 10,700	$ 54.2
1975	14,400	116,600	10,410	61.2
1976	15,500	114,100	$ 10,515	$ 68.0
1977	17,350	118,250	$ 11,400	$ 75.1
1978	17,450	122,600	12,840	82.7
1979	16,200	127,500	14,230	90.9
1980	15,500	132,200	15,400	99.6
1981	15,500	137,200	$ 16,600	$ 108.9
		UNITED STATES		
1974	8,900	61,800	$ 6,200	$ 30.2
1975	7,100	62,800	5,410	33.6
1976	8,000	61,150	$ 5,230	$ 37.3
1977	9,500	62,700	$ 6,000	$ 41.1
1978	9,200	64,700	6,900	45.2
1979	8,500	66,900	7,700	49.6
1980	8,000	69,200	8,400	54.3
1981	8,000	71,600	$ 9,100	$ 59.3
		INTERNATIONAL		
1974	7,500	50,000	$ 4,500	$ 24.0
1975	7,300	53,800	5,000	27.6
1976	7,500	52,950	$ 5,285	$ 30.7
1977	7,850	55,550	$ 5,400	$ 34.0
1978	8,250	57,900	5,940	37.5
1979	7,700	60,600	6,530	41.3
1980	7,500	63,000	7,000	45.3
1981	7,500	65,600	$ 7,500	$ 49.6

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MINICOMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	47,500	128,000	$ 940	$ 2.5
1975	51,900	179,900	1185	3.6
1976	63,800	243,700	$ 1590	$ 5.3
1977	84,000	325,400	$ 2200	$ 7.3
1978	107,000	428,800	2930	10.1
1979	135,000	558,000	3800	13.6
1980	165,000	714,000	4780	18.1
1981	200,000	900,000	$ 5930	$ 23.6
		UNITED STATES		
1974	34,700	100,800	$ 640	$ 2.0
1975	36,900	134,400	750	2.7
1976	46,600	176,300	$ 1035	$ 3.7
1977	61,000	228,800	$ 1470	$ 4.9
1978	77,000	293,800	1940	6.6
1979	95,000	372,200	2500	8.6
1980	115,000	464,700	3120	11.2
1981	140,000	574,000	$ 3830	$ 14.3
		INTERNATIONAL		
1974	12,800	27,200	$ 300	$ .5
1975	15,000	45,500	435	.9
1976	17,200	67,400	$ 555	$ 1.6
1977	23,000	96,600	$ 730	$ 2.4
1978	30,000	135,000	990	3.5
1979	40,000	185,800	1300	5.0
1980	50,000	249,300	1660	6.9
1981	60,000	326,000	$ 2100	$ 9.3

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U.S. MINIMAKERS' REVENUES JUMP 36% TO $1.9 BILLION AS IBM JOINS THE LINEUP WITH ITS SERIES/1

With shipments of 64,000 units in 1976 bringing U.S. minimaker revenues to within striking distance of $2 billion -- just two years earlier revenues cracked half that for the first time -- the bicentennial year was a good one. Growth that had dipped below 30% (lower for domestic shipments) during the recession sprang back to "normal" minicomputer levels . . . with domestic revenues topping $1 billion for the first time and attaining close to a 40% growth rate in 1976. By 1981, worldwide minicomputer revenues for U.S. suppliers should be more than $7.3 billion -- almost $5 billion in domestic revenues -- and the number of units shipped that year could easily surpass 200,000.

(These figures do not include the independent miniperipheral suppliers, who garnered $360 million in 1976 revenues, $90 million of which came from shipments to the minimakers. Industry growth rates that generally follow those of the minicomputer industry should lead to 1981 miniperipheral revenues over $650 million.)

Most of those units to be shipped in 1981 -- 70% or so -- will go to Original Equipment Manufacturers (OEMs) for use in other products, but almost two-thirds of revenues will come from end-user sales. While the fastest growing segment of the industry will be the micromini market -- leaping from nothing in 1974 to over $700 million in 1981 -- more significant growth will come in other areas:

- Services revenues, growing as the industry matures and builds its base, will provide over a fifth of minimaker revenues -- almost $1.5 billion.

WORLDWIDE MINICOMPUTER MARKET -- 1976 ACTIVITY
(Estimates of Units Shipped and $ Million Revenues; Copyright 1977 by IDC)

Company	Revenues	% Total	*75-76 Growth*	Units	% Total
Digital Equip.	$710	38%	*42%*	19,500	31%
Hewlett-Packard	304	16	*27*	5,500	9
Data General	179	10	*60*	6,800	11
HIS	112	6	*24*	1,600	2
General Auto.	79	4	*36*	3,750	6
Texas Instr.	58	3	*5*	3,000	5
Interdata	56	3	*30*	1,750	3
Varian	40	2	*5*	1,200	2
ModComp	38	2	*0*	650	1
Control Data	35	2	*17*	300	-
Computer Auto.	34	2	*36*	4,900	8
Microdata	34	2	*41*	1,880	3
Lockheed	23	1	*109*	1,265	2
Prime	23	1	*109*	460	1
SEL	23	1	*213*	150	-
Harris	20	1	*33*	250	-
DCC	18	1	*80*	3,500	5
Others	84	5	*14*	7,370	11
TOTALS	1,870	100%	*36%*	63,825	100%

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- Superminis like the PDP-11/70, Data General Eclipse, HP 3000, etc., will account for over 40% of revenues -- about $3.3 billion.

- Traditional minis will make up about 25% of revenues -- $1.9 billion.

(Note for statisticians: Because of the overlap between minicomputers and small business computers and end-user reshipments of minis overseas, the revenues of U.S. minimakers will not be congruent with the value of systems shipped.)

Enter the Giant

While the major minimakers jostled for their share of that 36% growth rate by adding new products and enhancing old ones, the real news for the year came out of Atlanta. Announcing the Series/1 in November, IBM's General Systems Division served notice that IBM would no longer ignore the fast-growing market for computers used as processing tools.

With the Series/1, though, IBM broke a few of its own internal conventions and a few of the minicomputer industry's . . . providing minimum software, offering no volume discounts, and marketing to sophisticated end users rather than the OEMs. IBM chose thereby to bypass the traditional minimaker avenue for building the high-volume production runs so important in the price-competitive mini world. More recently, GSD added PL/1 and FORTRAN capability, a real-time operating system, and four new CPU models to the line. Memory increments are now down to 7.4¢ a byte on one model; IDC's estimate of first year S/1 production is 1,000 units.

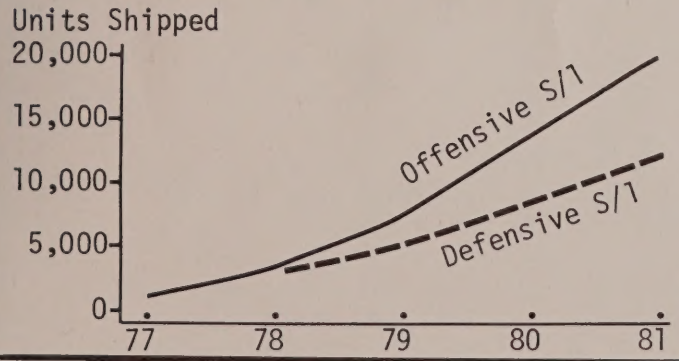
Will the Series/1 impact the other mininakers? Not exactly:

- IDC estimates the S/1's portion of minimaker revenues will grow from 2% in 1977 to about 17% by 1981, but

- Overall market forecasts, pegged at $6 billion in pre-S/1 estimates, have been expanded by almost a corresponding amount.

Thus, the mini industry as a whole is neither harmed nor hurt by IBM's entry. But there are ramifications beyond matters of revenue . . . where once the minimakers had to contend with IBM only indirectly in selling the concept of minicomputers, now they will have to contend with the Giant on a model-to-model basis. The market is liable to become a little less freewheeling now that users have a new standard for comparison . . . and as IBM's market share increases, others will necessarily decrease, perhaps unevenly.

IBM SERIES/1 FORECAST



IBM has both an offensive and defensive strategy available to it with the S/1. The later entails merely making the product available to those who want it. The former entails more support, software, memory, and peripherals, and use in other IBM products. Most analysts consider an offensive plan more likely.

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MINICOMPUTER CENSUS

The categorization of certain computers as "small business computers" is based on marketplace definitions as perceived by IDC. SBCs are those small general-purpose computers marketed by the major mainframers and their competitors to small business and first time users. They include offerings from the major mainframers (old Size Class 1 in the superceded Group A census); products such as DEC's Datasystem/300 from the minimakers aimed at commercial first time users; offerings from firms (like Qantel) that manufacture only SBCs; and offerings from companies that assemble systems from others' minis, such as Basic/Four did before beginning its own manufacturing operations.

Manufacturers with numbers or information that differs from that shown below are encouraged to contact Paul Arabasz, Census Editor, with more correct or updated information. All comments are appreciated.

AS OF JANUARY 1, 1977

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ESTIMATED PRODUCTION NEXT 12 MO.
Artronix	PC-12/730	12	2	20		9/71	150	NA	150	NA
	PC-12/770	12	4	76		2/74	20	NA	20	NA
	Modulex	16	1	8		7/75	NA	NA	NA	NA
Century Computer Corp.	C-200	8	1	5	7	2/71	150	0	150	NA
Cincinnati Milacron	CIP/2000 Series	8	1	4	17	7/69	2,080	290	2,370	NA
	CIP/4000	16				12/76				NA
Compiler Systems, Inc.	CSI-16	16	1	11	20	11/70	80	10	90	NA
	CSI-24	24	2	15	30	12/70	35	5	40	NA
Computer Automation, Inc.	108/208/808	8	1	5	11	4/68	280	30	310	X
	116	16	1	8	16	8/70	200	50	250	X
	216	16	1	8	20	7/69	350	45	395	X
	816	16	1	10	15	12/68	40	5	45	X
	Alpha-8	8	1	3	4	5/72				X
	Naked Mini-8	8	1	2	3	5/72	3,720	996	4,716	X
	Alpha-16	16	1	4	9	10/71				NA
	Naked Mini-16	16	1	3	7	10/71				NA
	LSI-2/10, 2/20, 2/60	16	1	2	4	12/73	8,730	440	9,170	NA
	LSI-3/05	16	1	1	2	2/76	343	94	437	NA
	Subtotal						13,663	1,660	15,323	
Computer Talk, Inc.	CT-400	16	2	25	30	9/75	3	0	3	20
	CT-407	16	2	32	32	5/77	0	0	0	6
Control Data Corp.	1700	16+2	4	37	160	3/66				X
	1700-SC	16+2	3	20	60	9/70				X
	System 17	16+2	2	14	39	2/74	750	500	1,250	NA
	Cyber 18-10	16+2	2	14	40	/76				NA
	Cyber 18-20	16+2	3	16	75	/76				NA
	Cyber 18-30	16+2	4	110	116	9/76				NA
	Elbit-100	12	1	6	8	6/67	5	445	850	NA
Data General Corp.	Nova	16	1	6	12	2/69	750	620	1,370	X
	Microнova	16	1	2	7	11/76	35	15	50	NA
	Nova-2/4	16	1	3	6	10/73	2,350	910	3,260	NA
	Nova-2/10	16	1	5	9	10/73	1,900	880	2,780	NA
	Nova-3/4	16	1	2	4	1/76	710	240	950	NA
	Nova-3/12	16	1	12	19	1/76	225	75	300	NA
	Nova-3/D	16	2	12	39	10/76	5	0	5	NA
	Nova-800	16	1	7	36	3/71	1,435	335	1,770	X
	Nova-820	16	2	12	28	4/72	1,020	300	1,320	X
	Nova-840/830	16	2	16	43	7/73	1,030	285	1,315	NA
	Nova-1200	16	1	6	13	12/70	4,460	1,215	5,675	NA
	Nova-1210/1220	16	1	3	8	2/72	3,730	1,100	4,830	NA
	Nova-1230	16	1	6	12	12/71	360	110	470	NA
	Supernova	16	1	9	25	4/70	190	85	275	X
	Supernova-SC	16	2	16	30	6/71	220	110	330	X
	Eclipse-S/100	16	2	12	30	2/75	760	280	1,040	NA
	Eclipse-S/200	16	2	16	48	2/75	680	250	930	NA
	Eclipse-S/230	16	2	15	36	10/76	30	10	40	NA
	Eclipse-C/300	16	2	24	115	2/75	135	50	185	NA
	Eclipse-C/330	16	4	30	116	11/76	5	0	5	NA
	Subtotal						20,030	6,870	26,900	
(Digital Computer Controls)	D-112	12	1	3	12	8/70	930	170	1,100	NA
	D-116	16	1	5	7	11/71	7,200	1,300	8,500	NA
	D-216	16+2		3		/77	0	0	0	NA
	D-316	16+2		3		/77	0	0	0	NA
	D-416	16		3		9/75	95	15	110	NA
	D-616	16+2		7		9/75	13	2	15	NA
	Mod 5	16+2		3		2/76	65	10	75	NA
	Subtotal						8,303	1,497	9,800	
Datamate Computer Systems*	DM-16	16	2	17	26	11/69	12	0	12	X
	DM-70	16	1	9	15	12/70	25	0	25	X
	DM-70/ROM	16	1	4	6	10/70	NA	0	NA	X
	ECP-18	18	1	14	16	11/66	21	0	21	X
Datum	Enhancer E1/16	16	1	8	15	3/76	8	0	8	20
Digiac Corp.	3060		1	19	13	1/70	70	20	90	NA
	3080	25	1	20	25	12/64	14	2	16	X
Digital Equipment Corp.	PDP-8/a, e, f, m	12	1	4	12	4/71	19,070	8,480	27,550	NA
	PDP-8/i, l, s	12	2	8	27	5/65	5,765	3,685	9,450	X
	PDP-9, 9L	18	2	35	50	12/66	290	160	450	X
	PDP-11/04, 05, 10, 15, 20	16	1	5	13	3/70	15,550	8,800	24,350	NA
	PDP-11/34, 35, 40	16	2	9	30	1/73	5,950	2,800	8,750	NA
	PDP-11/45, 50, 55	16	3	24	80	4/72	2,150	850	3,000	NA
	PDP-11/70	16	4	60	100	7/75	920	180	1,100	NA
	LSI-11, PDP-11/03	16	1	2	3	6/75	4,150	600	4,750	NA
	PDP-12	12	2	13	45	4/69	510	255	765	X
	PDP-15, XVM	18	3	15	75	2/70	550	305	855	NA
	Subtotal						54,905	26,115	81,020	
Digital Scientific Corp.	Meta-4	16	3	29	90	4/70	140	15	155	NA
Electronic Associates, Inc.	Facer-100	16	2	15	40	5/72	125	100	225	NA
Foto-Mem, Inc.*	Centaur-100	8	1	6	20	4/70	25	0	25	NA
General Automation, Inc.	GA-18/30	16	2	18	50	7/69	620	140	760	X
	SPC-12	8	1	4	16	1/68	4,150	950	5,100	Neg.
	SPC-16	16	1	5	25	5/70	7,500	4,500	12,000	2,000
	16/110	16	1	1	2	12/75	50	0	50	300
	16/220	16	1	2	3	1/76	450	50	500	1,000
	16/330	16	1	3	10	1/76	425	25	450	500
	16/440	16	1	9	25	7/75	700	300	1,000	800
	Subtotal						13,895	5,965	19,860	
GRI Computer	909 Series	16	1	4	9	1/70	320	150	470	X
	99/30	16	1	5	15	6/72	450	205	655	NA
	99/40	16	1	6	17	6/72	117	68	185	NA
	99/10	16	1	3	5	6/72	18	0	18	NA
	Subtotal						905	423	1,328	
GT&E (Tempo)	I	16	2	14	36	1/70	90	30	120	NA
	II	16	1	6	10	6/72	40	20	60	NA
Harris	6024/1	24	4	69	135	5/69	22	0	22	X
	6024/3	24	3	49	90	2/70	119	0	119	X
	Slash 4	24	4	24	110	8/73	180	15	195	90
	Salsh 5	24	3	16	50	5/72	330	15	345	35
	Slash 6	24	3	20	70	12/76	4	0	4	60
	Slash 7	24	4	85	180	10/75	14	1	15	10
	Series 100	24	4	85	160	10/75	33	7	40	35
	Series 200	24	4	179	240	10/75	18	2	20	20
	Subtotal						720	40	760	
Hewlett-Packard	2100A	16	1	7	15	6/71	7,700	3,300	11,000	200
	2100S	16	2	16	35	8/73	1,675	1,325	3,000	100
	2114-A/B	16	1	9	16	5/68	1,035	495	1,530	X
	2115-A	16	2	15	26	11/67	240	100	340	X
	2116-A/B/C	16	2	20	40	11/66	1,220	550	1,770	X
	2108-K	16	1	2	4	6/76	150	50	200	600
	21MX-M	16	1	4	15	6/74	4,500	2,000	6,500	2,200
	21MX-E	16	2	6	20	1/77	0	0	0	2,200
	3000	16	4	100	185	11/72	350	150	500	400
	3000-II	16	4	100	185	4/76				
	Subtotal						16,870	7,970	24,840	

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AS OF JANUARY 1, 1977

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ESTIMATED PRODUCTION NEXT 12 MO.
HIS										
GE/PAC	30	8	2	7	35	5/69	225	50	275	X
	3010	16	3	13	90	5/70	25	1	26	X
	3010/2	16	4	15	140	12/71	NA	NA	NA	NA
Honeywell	112	12	1	5	10	11/69	222	48	270	X
	116	16	3		65	4/68	172	35	207	X
	316	16	2	8	45	6/69	1,300	715	2,015	X
	416	16	2	17	43	4/67	198	130	328	X
	516	16	3	24	95	10/66	735	415	1,150	X
	700 Series	16	3	16	65	6/72	1,650	1,300	2,950	300
	164X Series	16	4	144	440	12/69	20	8	28	X
	6/06	16	2	8	42	1/76)	)	)	)	)
	6/34	16	1	3	18	1/76)	600)	350)	950)	1,800
	6/36	16	2	8	35	1/76)	)	)	)	)
	6/43	16	2	10	45	1/77	0	0	0	240
	Subtotal-HIS						5,147	3,052	8,199	
Information Technology, Inc.	4900/5	8	1	3	5	10/70	NA	NA	NA	NA
	4900/10	16	1	10	20	10/65	25	0	25	X
Interdata	1	8	1	44	11	9/70	210	77	287	X
	2	16	1	11	14	7/68	14	0	14	X
	3	16	1	13	20	5/67	210	5	215	X
	4	16	1	9	21	8/68	320	132	452	X
	5	16	1	11	25	11/70	70	16	86	X
	13/15	16	2	22	35	9/69	12	7	19	X
	16/18	16	2	15	30	8/71	2	7	9	X
	50	16+1	1	7	19	4/72	43	13	56	X
	55	16+1	2	16	40	8/72	90	27	117	X
	70	16	3	9	65	12/71	1,030	327	1,357	50
	74	16	2	3	34	2/73	300	56	356	X
	80	16	2	15	44	7/72)	70)	18)	88)	X
	85	16	3	23	60	7/73)	)	)	)	X
	5/16	16	1	1		/77	0	0	0	NA
	6/16	16	1	2	25	1/76	225	55	280	500
	7/16	16	2	3		2/74	2,375	408	2,783	1,000
	8/16	16	1	4		/77	0	0	0	NA
	7/32	32	3	10		7/74	415	83	498	200
	8/32	32	4	55	160	6/75	130	34	164	100
	Subtotal						5,516	1,265	6,781	
International Business Machines	Series/1	16	2	10	40	11/76	100	0	100	1,000
Keronix	IDS-16/8	16	1	3		4/74)	)	)	)	NA
	IDS-16/10	16	1	3		4/74)	500)	0)	500	NA
	IDS-16/12	16	1	3		4/74)	)	)	)	NA
Lockheed Electronics Co., Inc.	LEC-16	16	1	11	22	3/69	480	55	535	X
	LEC-Jr	16	1	8	16	1/71	1,970	374	2,344	NA
	SUE-111X	16	1	6	10	9/72	1,920	311	2,231	NA
Microdata Corp.	400	8	1	3	4	1/70	155	0	155	X
	800/810/812/820	8	1	6	11	5/69	2,055	1,380	3,435	X
	1600	8	1	5	11	2/72	5,735	990	6,725	600
	3200/3230	16	1	8	14	3/74	100	100	200	50
	Micro One	8	1	1	3	11/74	800	120	920	X
	Subtotal						8,845	2,590	11,435	
MiniComp	MD-708	8	1	5	7	8/70	50	0	50	NA
Modular Computer Systems	Modcomp-I	16	1	2	9	10/71	640	140	780	NA
	Modcomp-II	16	1	4	40	3/71	1,015	315	1,330	NA
	Modcomp-III	16	2	13	44	12/70	70	5	75	X
	Modcomp-IV	16/32	3	19	100	5/74	160	75	235	NA
	Subtotal						1,885	535	2,420	
Motorola Communications Division	MDP-1000	8	1	8	19	2/69	75	0	75	X
Omnitec (BIT)*	480	8	1	6	17	12/66	195	3	198	X
	483	8	2	9	33	1/70	115	40	155	X
Prime Computer	100	16	1	4	11	4/73	207	397	604	NA
	200	16	1	6	35	11/72	220	59	279	NA
	300	16	3	12	56	9/73	180	141	321	NA
	400	16	4	50	132	6/76	28	9	37	NA
	Subtotal						635	606	1,241	
Raytheon Data Systems	703	16	1	13	23	10/66	179	33	212	X
	704	16	1	10	18	3/70	690	200	890	15
	706	16	2	19	30	5/69	75	17	92	X
	RDS-500	16	1	8	14	12/73	275	75	350	350
	Subtotal						1,219	325	1,544	
Redcor Corp.*	RC-70	16+2	2	15	30	7/68	100	40	140	X
Systems Computer Corp.*	500	8				6/72	NA	NA	NA	X
	1000	8	1	4		1/71	400	200	600	X
	1500	8				6/72	NA	NA	NA	X
Systems Engineering Laboratories	32/35	32	2	30	45	9/76	10	0	10	250
	32/55	32	3	50	95	8/75	150	25	175	200
	32/75	32	4	70	125	/77	0	0	0	150
Tandem Computers, Inc.	T16/213	16	4	90	150	5/76	16	1	17	50
	T16/243	16	4	90	150	9/76	8	3	11	75
Texas Instruments	960-A/B	16	2	14	30	6/70	2,900	1,200	4,100	NA
	980-A/B	16	2	17	40	5/68	3,150	1,350	4,500	NA
	990/4	16	1	8	10	6/76	420	180	600	NA
	990/10	16	2	20	30	3/76	350	150	500	NA
	Subtotal						6,820	2,880	9,700	
Unicom, Inc.*	CP-8A	8	1	3		2/70	105	55	160	X
	CP-8B	8	1	3		3/70	78	30	108	X
	CP-8C	8	1	5		3/70	130	70	200	X
	CP-8D	8	1	7		4/70	30	10	40	X
	Subtotal						343	165	508	
Unicomp*	Comp-16	16	2	11	29	6/70	26	0	26	X
	Comp-18	18	2	12	38	8/70	38	0	38	X
Varian	5201	16	1	6	13	9/68	330	170	500	X
	620/a	16	3		75	12/65	120	30	150	X
	620/f	17+1	1	11	25	6/70	170	80	250	X
	620/f-100	16	1	10	22	6/72	300	140	440	X
	620/i	16+2	1	10	20	12/65	920	380	1,300	X
	620/L&100c	16	1	5	12	2/71	720	320	1,040	X
	620/L-100	16	1	6	14	6/72	840	410	1,250)	400
	R620/i, R622/i	16+2	2	15	29	6/69	155	65	220)	
	V-72	16	2	10	45	2/74	600	270	870)	150
	V-73	16	2	16	45	11/72	1,180	520	1,700)	
	V-74	16	3	40		5/74	210	90	300	X
	V-75	16	3	39		8/75	120	50	170	X
	V-76	16	2	8		1/76	210	90	300	250
	V-77-200	16	1	2	5	1/77	0	0	0)	
	V-77-400	16	1	5	19	12/76	10	0	10)	1,500
	V-77-600	16	2	8	40	3/77	0	0	0)	
	Subtotal						5,885	2,615	8,500	
Westinghouse Electric	P-50	14	1	16	23	8/64	182	40	222	X
	P-2000	16	2	10	27	8/69	111	90	201	NA
	2500	16	2	10	30	11/71	210	70	280	NA
Xerox*	CE-16, 16/A	16	1	8	23	6/69	35	10	45	X
	Sigma-2	16	4	24	125	12/66	170	80	250	X
TOTAL							176,315	67,352	243,667	

*Not currently active in new production of minicomputers.

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SMALL BUSINESS COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1974	5,000	5,750	$ 200	$ .2
1975	10,000	15,750	400	.6
1976	20,000	35,750	$ 750	$ 1.4
1977	27,500	64,100	$ 1100	$ 2.5
1978	38,000	100,000	1400	3.8
1979	46,000	142,000	1680	5.2
1980	58,000	193,500	1950	6.9
1981	68,000	250,000	$ 2230	$ 8.7
		UNITED STATES		
1974	3,700	4,200	$ 150	$ .2
1975	7,500	11,700	300	.5
1976	13,500	25,200	$ 500	$ 1.0
1977	18,800	44,000	$ 750	$ 1.7
1978	26,200	69,000	950	2.6
1979	31,500	98,000	1150	3.6
1980	40,800	135,000	1350	4.8
1981	47,500	176,000	$ 1550	$ 6.1
		INTERNATIONAL		
1974	1,300	1,550	$ 50	$ -
1975	2,500	4,050	100	.1
1976	6,500	10,550	$ 250	$ .4
1977	8,700	20,100	$ 350	$ .8
1978	11,800	31,000	450	1.2
1979	14,500	44,000	530	1.6
1980	17,200	58,500	600	2.1
1981	20,500	74,000	$ 680	$ 2.6

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SMALL BUSINESS COMPUTER SHIPMENTS HIT $750 MILLION IN 1976 AS IBM'S S/32 AND OTHERS PRY OPEN FIRST TIME USER MARKETS

If it's not always clear when a small computer can be termed a "small business computer," it is clear when the market for such systems came into its own . . . with the advent of IBM's System/32. With over 10,000 systems installed by 12/76, IBM commands the market with almost a 30% share. Wang comes a close second with 24%; DEC and Basic/Four split another 19%. NCR holds 4%, while the remainder is divided by a host of minimakers and independent systems houses. (Counting only its B 80, Burroughs' share was 1%, but that will change as shipments crank up.)

With 300,000-500,000 small businesses in the U.S. alone, the market for SBCs is largely untapped. Those that do cater to it have discovered that selling to the first time user is a different ball of wax:

- First time users are uninformed about computers . . . the trade press doesn't reach them, and the array of products and vendors is confusing.
- Buying is usually done by company presidents and founders . . . and information needs are often idiosyncratic to the firm and individual.
- Service and reliability are probably the most important criteria concerning potential SBC buyers. Solutions count, not equipment.

IBM's relatively late entry into the SBC market may have irked some of the veteran vendors, but by helping initiate a whole new stratum of users, it will provide much of the momentum that will triple 1976 revenues ($750M) by 1981.

SMALL BUSINESS COMPUTER CENSUS

The categorization of certain computers as "minicomputers" is based on marketplace definitions as perceived by IDC. Minis are general-purpose in design but sold as tools, not just solutions; are available from the makers as complete systems, not just boards; are available to OEMs and usually discounted in volume buys; and are part of a family that has at least one product in the $2,000-$25,000 price range and comes with at least 4K RAM. Price classes are:

Price classes: (1) $25,000 (2) $25,000-$50-000 (4) $100,000 and up; Average System Value

Manufacturers with numbers or information that differs from that shown below are encouraged to contact Paul Arabasz, Census Editor, with more correct or updated information. All comments are appreciated.

AS OF JANUARY 1, 1977

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE ($1,000) BASIC	AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ESTIMATED PRODUCTION NEXT 12 MO.
Advanced Information Design	System 3000	Interdata 6/16,8/16		28		3/75	20	0	20	NA
	System 4000	Interdata 7/32,8/32		58		10/76	NA	0	NA	NA
American Management Systems, Inc.	AMS OE/IC	Nova-3		14		1/76	4	0	4	NA
Anderson-Jacobson, Inc.	1400	1400	a	16	22	1/70	260	15	275	20
	1500	1500		23		5/77	0	0	0	NA
Applied Data Processing, Inc	Resource/100	Nova 3/12		39	62	6/76	9	0	9	37
Applied Digital Communications	101	Datapoint 1100		30		8/76	NA	NA	NA	NA
	201	Lockheed II or III		40		/77	NA	NA	NA	NA
	301	Varian V-76		50		1/75	4	0	4	NA
Applied Digital Technology	unnamed	SPC 16/45,16/65		50		1/72	10	0	10	NA
Ball Computer Products	DASL	Nova-2/10		38		6/75	3	0	3	NA
Basic/Four Corp.	350	Microdata, BFC 1300	b	34	34	9/71	190	)	)	75
	400	Microdata, BFC 1300	b	37	45	9/71	920	) 1600	) 3000	825
	500	Microdata, BFC 1300	b	39	50	9/71	100	)	)	X
	600	Microdata, BFC 1300	b	51	65	8/76	190	)	)	275
	700	BFC 1320		115		/77	0	0	0	160
Basic Timesharing, Inc.	4000/15	BTI 4020		36		1/76	NA	NA	NA	NA
	4000/25	BTI 4020		56		1/76	NA	NA	NA	NA
BDS Computer Corp.	BDS-3	PDP-11/03		8			NA	NA	NA	NA
Binary Data Systems	UCOM-1	Nova-3		40	60	/76	35	0	35	15
	UCOM-2	Dual Nova-3		95	120	/76	12	0	12	10
	UCOM-3	Eclipse		120	170	/76	2	0	2	2
Burroughs Corp.	B-80	B-80		20	35	11/76	50	15	65	NA
Business Controls Corporation	System 80	PDP-8/a		30	35	/71	80	0	80	30
	System 80	PDP-11/34		35	65	/75	10	0	10	15
Business Systems Products, Inc.	Adviser II			35	45	7/76	NA	NA	NA	100
	Adviser III			65	85	9/76	NA	NA	NA	300
Cascade Data, Inc.	Concept II	Concept		25	45	6/75	175	0	175	110
	80/20	Concept		28	35	1/70	)	)	)	X
	80/30	Concept		31	40	1/70	) 150	) 75	) 225	X
	80/40	Concept		46	57	1/70	)	)	)	X
Century Computer Corp.	C-400	C-200			45	3/75	125	25	150	120
	C-700	C-200			55	6/76	25	6	31	60
	Opus III	C-200			22	2/71	560	40	600	X

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AS OF JANUARY 1, 1977

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ESTIMATED PRODUCTION NEXT 12 MO.
Cincinnati Milacron	George-40	CIP/2200B		16	20	2/77	0	0	0	NA
	George-60	CIP/2200B		26	34	/76	315	55	370	NA
	George-70	CIP/2200B		26	39	/76				NA
	George-80	CIP/4400		43	58	12/76				NA
	Other	CIP/2200B		23	42	/74				X
Clary Data Systems	404	Clary		6	30	1/70	100	32	132	X
Complete Computer Systems	II-3	Nova-3/12		36		10/76	NA	NA	NA	NA
	III-3	Nova-3/12		48		10/76	NA	NA	NA	NA
	IV-3	Nova-3/12		64		10/76	NA	NA	NA	NA
Compucorp	402	Compucorp 3000		13	15	1/76	15	450	465	NA
	450	Compucorp 3000		20	22	4/76	40	100	140	NA
Compumatics	Whizkid 100	Compumatics		12		9/76	NA	NA	NA	NA
Computer Covenant	CPBS 1	PDP-11/04		24		6/76	NA	NA	NA	NA
	CPBS 2	PDP-11/34		42		9/76	NA	NA	NA	NA
	CPBS 3	PDP-11/70		100		12/76	NA	NA	NA	NA
Computer Hardware, Inc.	2120	CHI		15	50	5/75	10	1	11	12
	2130	CHI		33	75	11/74	130	2	132	20
	3230	CHI		77	90	/77	0	0	0	12
Computer Horizons, Corp.	CHC Distribution System	PDP-11/34,11/70		30		/77	0	0	0	NA
Computer Interactions Inc.	Compo II	PDP-8/e,f,or m		45	60	11/72	112	0	112	40
	Compo II-11	PDP-11		50	60	6/75	70	0	70	20
Decision Data Computer Corp.	System/4	System/4		23	37	8/76	15	0	15	500
Design Data	N312	Nova-3/12		31	75	8/75	100	10	110	200
	EC 300	Eclipse-C/300		60	150	3/76	40	10	50	100
Digital Computer Controls	1500	DCC-416	c	16		/76	15	0	15	NA
	2500	DCC-Mod 5	c	29		/76	25	0	25	NA
	3700	DCC-616	c	40		/76	10	0	10	NA
Digital Equipment Corp.	Datasystem 300	PDP-8, PDP-11		14	25	/72	2100	1100	3200	NA
	Datasystem 500	PDP-11		58	80	/72				NA
Digital Systems Corp.	Galaxy/5-130	Galaxy/5		33	50	1/76	4	0	4	8
	Galaxy/5-140	Galaxy/5		61	80	8/76	6	0	6	12
	Galaxy/5-150	Galaxy/5		120	130	12/76	2	0	2	4
	Galaxy/5-160	Galaxy/5		230		/77	0	0	0	2
	Galaxy/5-170	Galaxy/5		358		/77	0	0	0	2
Dimis, Inc.	Total 100	Modcomp II		135	150	7/74	5	0	5	7
Display Data Corp.	Insight	Microdata 1600/30		38	62	1/74	175	0	175	140
Educomp Corp.	E-100,200	PDP-8		7	9	/72				NA
	E-250,400	PDP-8		16	25	/72				NA
	E-450,500	PDP-8		32	43	/75	145	6	151	NA
	E-600,700,710	PDP-11		44	68	/75				NA
	E-800,910,940,960	PDP-11		102	150	/75				NA
Financial Computer Corp.	System III/10 (Fedder)	System III		38	45	1/75	250	25	275	200
GRI Computer Corp.	System 99	GRI 99/50		20	30	11/74	115	35	150	NA
General Automation, Inc.	DM-130/2	SPC-16/45		28	28	12/74	100	175	275	200
	DM-130	SPC-16/45		30	38	12/74	50	25	75	50
	DM-140	SPC-16/65		48	80	1/75	8	17	25	5
General Information Systems	GIS-350 ABLE	PDP-11/34		45		1/76	4	0	4	NA
General Robotics Corp.	GRC-11/03	PDP-11/03		14		7/76	10	0	10	NA
	TSS/11	PDP-11/34		60		12/75	7	0	7	NA
Hotel Computers, Inc.	unnamed	Varian V-72		125		5/73	10	0	10	NA
Information Associates, Inc.	TIS	Nova-830		47		9/74	5	0	5	NA
International Business Machines	System/32				38	3/75	8000	2500	10500	8000
International Computing Company	System 95/99	Nova-2/10		24		10/72	9	0	9	NA
IST Datasystems	TPS	Nova-3/12		25			NA	NA	NA	NA
	BPS	Eclipse-S/200,C/300		40		9/76	NA	NA	NA	NA
Jacquard Systems	J-100			15		8/75	NA	NA	NA	NA
Lockheed Electronics Co., Inc.	System III	Lockheed SUE		30	50	1/73	1080	157	1237	NA
Logical Machines Corp.	ADAM	ADAM		40	40	4/75	75	75	150	400
Martin Wolfe, Inc.	Mesa Two 7000	DCC 116		54		12/71	140	0	140	0
	Mesa Two 4000	DCC 116		62		2/76	3	0	3	0
Med Scientific International Corp.	unnamed	Nova-3		110			NA	NA	NA	NA
Microdata Corp.	Reality	1600		39	68	12/73	692	58	750	840
	Reality 11	1600		32	34	12/76	1	0	1	200
	Express Series	Express		39	50	11/76	5	0	5	100
Mini-Computer Systems, Inc.	MICOS 1003	Nova-3/12		50	55	/73	180	70	250	
	MICOS 5003	Nova-3/12		72	80	8/75	35	15	50	400
	MICOS 7003	Nova-3/12		83	90	8/75	145	55	200	
	MICOS 9003	Nova-3/D		99	110	8/75				
Minuteman Computer Corp.	1774	Nova-2/4		35	40	11/71	30	0	30	NA
	1775	Nova-2/10		37	44	3/72	12	0	12	NA
	1776	Nova-2/10		40	59	3/72	20	0	20	NA
Modcomp Business Systems	204	Modcomp II		55		/76	NA	NA	NA	NA
	232	Modcomp II		96		/76	NA	NA	NA	NA
Mylee Digital Sciences Inc.	3036	Mylee 3G		38	45	5/76	17	0	17	36
	3088	Mylee 3G		41	52	5/76	21	0	21	36
NCR Corp.	8200	NCR		33	66	9/75	670	730	1400	NA
	8250	NCR		42	78	12/76	15	5	20	NA
Norfield Datasystems, Inc.	Nova-system	Nova		35		6/73	20	0	20	NA
	Eclipse-system	Eclipse C/300		75			NA	NA	NA	NA
Northrup Data Systems	BDS-700			39	50	3/77	0	0	0	NA
	BDS-1000	Microdata 1600		50	75	6/72	35	0	35	NA
	BDS-2000	Microdata 1600		63	100	10/73	40	0	40	NA
Pako Corp.	Pricing System	CAI LSI 2/20		32		6/75	NA	NA	NA	NA
	Pricing/Invoicing System	CAI LSI 2/20		70		6/75	NA	NA	NA	NA
Programmed Control Corp.	Prophet 21/1	TI 960 B		42		/72	15	0	15	NA
	Prophet 21/2	TI 990/10		42		1/77	0	0	0	NA
Qantel	800/900	Q7		28	29	5/75	93	71	164	98
	950	Q7		32	36	11/75	144	45	189	157
	960	Q7.5		48	56	11/76	15	5	20	15
	1200	Q7		42	59	11/75	213	23	236	1
	1300	Q7.5		42	59	11/75	44	18	62	28
	1400	Q7.5		44		5/77	0	0	0	47
Randal Data Systems	Link-100	Randal-100		13	23	10/75	121	0	121	200
	Link-200	Randal-200		24	35	10/76	70	0	70	200
	Link-300	Nova-2/10		34	45	6/74	27	0	27	0
	Link-400	Nova-2/10		36	45	6/74				0
STC Systems	ULTIMACC-2000	Nova-1200		41	57	9/72	80	2	82	10
	ULTIMACC-3000	Nova-830		47	77	1/75	60	2	62	20
	ULTIMACC-3370	Nova-830		86	125	11/75	5	0	5	10
Tal-Star, Inc.	TDMS System	GA 18/30		74		/72	NA	NA	NA	NA
Tri-Star, Inc.	TTK-10	Nova-3/12		45	55	2/76	12	0	12	30
	TEK-80	Nova-3/12		52	67	4/76	4	0	4	10
Vanguard Computer Systems, Inc.	V500	Raytheon RDS 500		65	85	3/76	3	2	5	20
	V400	Raytheon RDS 500		45	45	/77	0	0	0	10
Wang Laboratories, Inc.	WCS-20	Wang 2200		10	15	/73	3350	1650	5000	NA
	WCS-30	Wang 2200		20	30	/73	2550	1250	3800	NA
Warrex Computer, Corp.	Centurion I-A	CC-201		18	19	/77	0	0	0	70
	Centurion II	CC-202		27	30	/75	25	0	25	0
	Centurion III	CC-203		36	36	/74	170	0	170	89
	Centurion IV	CC-204		43	43	/75	15	0	15	5
	Centurion VI	CC-206				/77	0	0	0	NA
TOTAL							25188	10552	35740	

Notes:

a. Includes installations of Eldorado-140.
b. Basic/Four Corporation computer models used Microdata processors until November, 1976.
c. DCC became a subsidiary of Data General Corporation in early 1977.

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COMPUTER SERVICES GROW STEADILY TOWARD 1981 REVENUES OF $11 BILLION AS REMOTE OFFERINGS START TO OVERTAKE TRADITIONAL BATCH PROCESSING

Computer services -- software, facilities management, and outside data processing -- did well in 1976 as they zeroed in on the $5 billion revenue mark with a 17% growth rate. With over 2,000 outfits currently offering "computer services," the industry is highly-fragmented . . . but beginning to consolidate around a base of six companies. Control Data, Computer Sciences, Automatic Data Processing, Electronic Data Systems, System Development Corp., and GE/ISBD each rang up over $100 million in sales in 1976 and together accounted for a fourth of the market.

In the face of strong competition -- from minis, micros, small business computers, and data processing networks -- services vendors flexed their muscles last year with a new array of software packages (27% growth), and remote autotransaction services (35% growth). With a projected growth rate of 16%-20% per annum over the next five years (to $11 billion by 1981), the services industry continues to burrow into its niche of offering industry/application expertise to EDP users. The future appears particularly bright for suppliers who:

+ Diversify and improve software products
+ Expand remote DP and data transmission services
+ Cater to the first-time user market
+ Incorporate minis/intelligent terminals into offerings
+ Challenge in-house DP departments with better backup, support, documentation, and responsiveness

Non-processing services

Most computer users have their own staff, but new systems programs -- DBMS, telecommunications, etc. -- can be costly and slow to develop, and many users are turning to software packages. Although contract development software still holds about 60% of outside software spending, packaged software is expected to outpace it within a few years. (To date, 227 software packages have passed the $1 million mark in sales; Cincom's TOTAL alone has topped $50 million.) By 1981, outside software should beget $2 billion in revenues -- about half going for packages.

Some attractive future markets include: "hardwiring" software for microprocessors, developing turnkey systems for first-time users, and creating new software packages and telecommunications monitors for DP networks.

For those who don't want the hassle (management control, hidden costs, etc.) there is always facilities management . . . which grew 16% last year to revenues of $495 million. Of software services, facilities management, and processing services, FM will show the slowest growth rate through 1981, with industry-specific FM services countering a downward trend in commercial custom services.

Processing services . . .

. . . once again dominated services in 1976 with over 70% of revenues ($3.6 billion). Although this ratio will remain steady through 1981, change will occur within the processing market itself. Batch processing led in 1976 revenues with a 52% share ($1.8 billion), but remote problem-solving and autotransaction were catching up. This year the combined revenues of these remote services will pass batch for the first time. By 1981, remote autotransaction -- on a 35%/year growth rate -- will command the market with a 42% share, batch will shrink to 30%.

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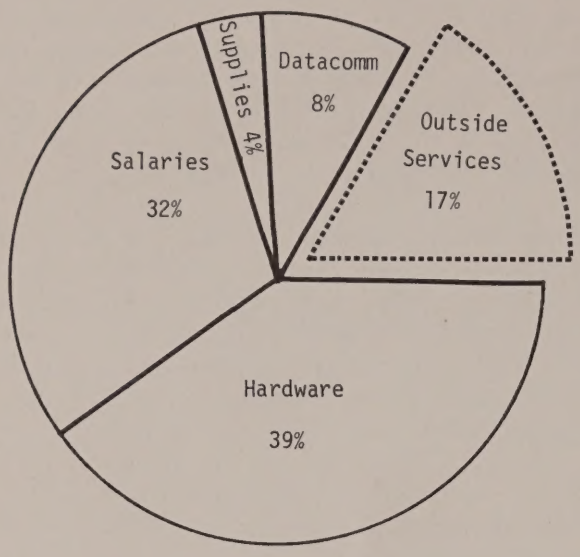
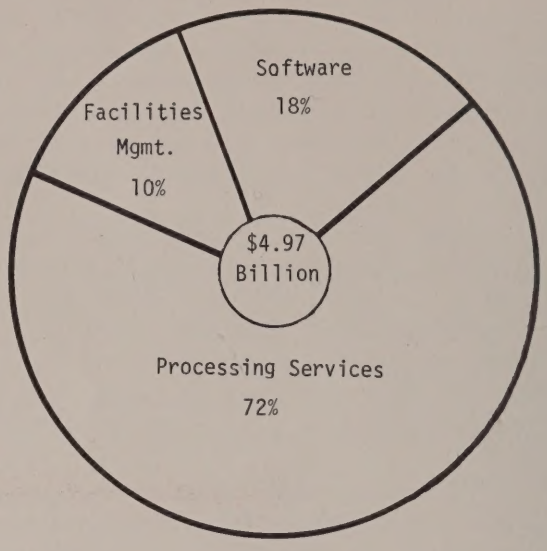
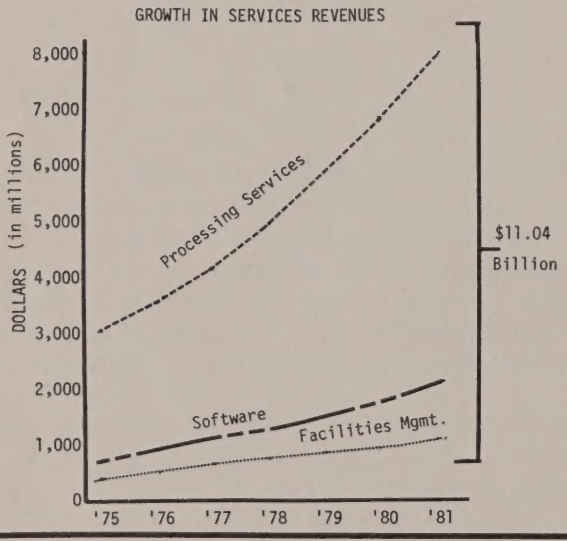
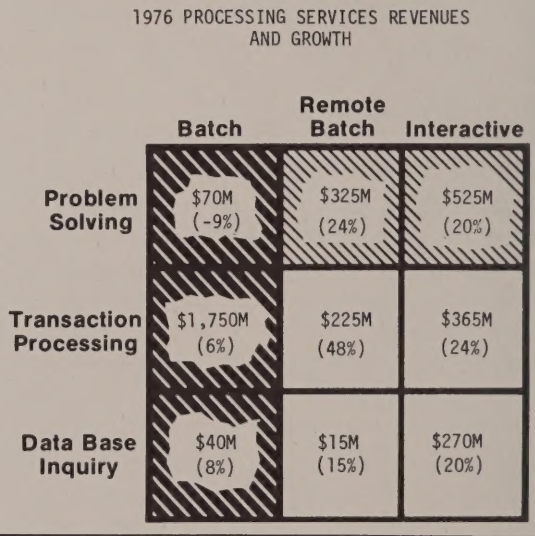
THE COMPUTER SERVICES MARKET









The future for processing services looks bright . . . as service bureaus continue to offer the customer "handholding" that so strains the support resources of hardware manufacturers and continue to make it their business to know a customer's business as well as him. Meanwhile, companies get acquired, product uniqueness provides entrepreneurial opportunity, and good service begets more business from customers no longer enamored of the computer.

The big question is IBM. In 1979 the company will no longer be barred from offering computer services -- an outgrowth of the CDC antitrust suit settlement -- and the Giant's domsat subsidiary, Satellite Business Systems (SBS), will be gearing up to offer its unique data transmission service. IBM's not likely to ignore the networking capabilities made possible by SBS . . . nor a potential $8 billion 1981 market for processing services. The form and thrust of IBM's next "service bureau" should be interesting indeed.

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DISTRIBUTED PROCESSING . . . HARD TO PIN DOWN, HARDER TO IGNORE

If there's to be an offspring of the collision between the computer and communications industries, "distributed processing" may well be it. With processing power getting cheaper all the time -- faster than communications costs are falling -- the incentive for users to decentralize a portion of their DP operations grows stronger all the time. The fact that vendors on all sides -- minicomputers, intelligent terminals, mainframes, data entry, and even computer services -- are touting DDP's virtues adds to the allure.

It also adds to the confusion. In study after study, while IDC finds that interest in "distributed processing" is intense . . . it also finds there is no clear consensus as to what the phenomenon actually is. IDC's working definition, however -- which distinguishes between "distributed" and "decentralized" processing -- recognizes some common elements running through most DDP systems. A true-blue DDP setup would include:

- A network of processing nodes functionally or geographically distributed that are connected via some communications link . . . not necessarily an electronic one.

- The storage and manipulation of data at each node . . . meaning decentralized/distributed data bases accessible to other nodes.

- Some sort of central control -- software development, hardware acquisition, etc. -- so the pieces of the net fit together as a system, not just a collection of interconnected, independent nodes.

If definitions aren't clear, at least the pros and cons of DDP are. Where the 80-20 rule applies (80% of the DP done for a site is important only to that site, 20% gets passed on), users are finding that downstream processors with local storage are cheaper than data communications. In addition, the idea of giving local managers' responsibility -- and accountability -- for their own DP has its appeal. On the downside, distributed processing means moving the electronic equipment and programs away from the pool of expertise best qualified to deal with bugs, breakdowns, and changes. (Mini-based or not, the equipment is still complex, trouble-shooting and debugging still a technical chore). Network management is another possible DDP migraine.

Also, until the advent of the Series/1, DDP meant for the most part using non-IBM gear. For many companies, that was an unpopular choice.

So, most DDP systems involve long lead times for development, phased implementations, frequent cost justification, and a certain amount of pioneering . . . and revenues directly attributable to DDP are not yet gushing in to vendor coffers. Still, if the success of companies like Burroughs, Datapoint, Sycor, Four-Phase, and Raytheon -- whose intelligent terminals have done so much to boost DDP -- is any indication, DDP is here to stay. Ask companies like Entrex, Inforex, Data 100, CMC, Mohawk, Honeywell, NCR, and even IBM . . . all of whom are clamoring at the gates.

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For readers interested in following DDP and data communications, IDC now offers the low-cost Distributed Processing Reporting Service, featuring a monthly newsletter, special reports, and news memo. . . providing a quantitative picture of DDP and datacomm. For more info, contact IDC or the editors of EDP/IR.

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• NEW TECHNOLOGIES ARE BEGINNING TO TURN UP IN THE MARKET: Texas Instruments, for instance, has opted to put its magnetic bubble memory (EDP/IR,March 11, 1977) to use in two new models of its "Silent 700" terminals. Each terminal will come with 20,000 bytes -- expandable to 80,000 -- of the non-volatile memory. TI says this is the first known commercial use of bubble memories. Still another type of memory technology -- that of charge-coupled devices -- was used by Burroughs in its "Burroughs Scientific Processor," announced this month (see page 5). The CCD memory is used to store programs and data used by both the system's control processor and vector processor and has a storage capacity of 4 million words, expandable to 67 million words.

Technology buffs are also studying a thing called the "Wiegand Effect" these days. The technology, according to the company that bought the patents from inventor John Wiegand, is a new pulse generating method requiring only a permanent magnet, a pick-up coil, and a specially-treated "Wiegand wire." Because of the wire's magnetic properties, subjecting it to a small external magnetic field induces a relatively powerful (one to three volts) pulse without an external power source. Applications are foreseen in automobile ignitions, industrial controls, and electronics . . . and one of the first licenses to study and use the technology went to none other than IBM.

• PACKET-SWITCHING IS GETTING COSMOPOLITAN: Telenet and ITT WorldCom have entered into an interconnection agreement for the provision of packet-switched data communications between the U.S. and overseas points (Telenet will also be interconnecting with overseas packet-switching facilities operated by RCA GlobCom). ITT WorldCom calls its side of the service its "Universal Data Transfer Service" and will offer packet-switching to countries overseas and interconnection to other U.S. packet nets, such as Tymnet, in addition to Telenet.

• MINILAND IS REPLETE WITH NEW PRODUCTS: Data General ended the first quarter of 1977 by announcing the newest member of its Eclipse family, the S/130, for users too big for a Nova 3 and too small for a regular Eclipse. DEC announced two new "Distributed Plant Management" systems, the DPM 60 and DPM 80, based on its PDP-11/34 and 11/70 minis. Linking I/O devices with the host CPUs will be a specially-designed 56KHz cable called the DECdataway with its own controller acting as a front end to the CPU. Varian has added a family of high-speed disks to its recently-announced V77 minis, providing capacities up to 4.8 billion words (unformatted) on the minicomputers that Varian says "think like mainframes." Last but certainly not least, Systems Engineering Labs has a new top of the line in its recently-announced SEL 32/75 computer. Says the company, "The SEL 32/75 offers the power and architectural features associated with large-scale computers like the DEC 10 and 20 Series -- but at minicomputer prices." The average system, according to SEL, will probably sell for under $125,000.

• FIRST SERIES/1 USERS TO IBM'S GSD: The machine looks good in the development stage and thanks for recently adding a numeric pad to the terminal keyboard. We could use a printer that doesn't eat up so much paper.

• FROM OUR INDUSTRIOUS NEIGHBORS TO THE WEST: Fujitsu is said to be readying an enhanced version of its M-190 (tentatively designated the M-190H) reported to be a four-unit multiprocessor with a price/performance 40% higher than IBM's 3033. The M-190H, according to EDP/IR sources, will be "entirely different" from the Amdahl uniprocessors -- which Fujitsu is helping to manufacture. And closer to home, Nippon Electric has formed a new U.S. computer company.

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REVIEW & FORECAST

EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" APRIL 30, 1976 • VOL.11,NO.18&19 P.J.McGOVERN, PUB.

Reaching for the '80s

AFTER A LEVEL 1975, SEVERAL YEARS OF SHIPMENT INCREASES FORECAST

As the computer industry emerges only slightly bruised from the recent recession, the backbone of strong fundamental demand for data processing products and services becomes more apparent by the day. As a result, EDP/IR predicts a rapid bounceback . . . and recovery at a higher rate than previously anticipated.

U.S. shipments of general-purpose mainframes in the years ahead will be lower than forecast last year. But they will also be less cyclical. This is largely because IBM is now expected to continue the staged introduction of nonrevolutionary new equipment -- souped-up 370s, enhanced software, etc. The result: Lower system retirements and a higher-than-normal percentage of user purchases.

Internationally, 1975 shipments of general-purpose computers were better than expected, and the five-year outlook is good. After a second year of 10% growth in 1976, shipments should increase some 14%-to-15% annually for the rest of the 1970s.

For minicomputer vendors -- set back to "only" 30% growth in revenues for 1975 -- this year looks bright, with revenues jumping 40% to the $2.2 billion level. Growth will continue as the decade stretches toward 1980 . . . when revenues will top $5 billion. For suppliers of computer services, the future also looks bright. Revenue growth (to $3 billion in 1975) slipped below 20% last year, but will rebound to normal levels . . . producing 1980 revenues just shy of $8 billion.

Three important trends, smoldering during the recession, are expected to burst forth and fuel much of the growth. They sum up the state of computing, 1976:

- Data base applications . . . starting with the leading-edge users and spreading downward, the use of large, computerized data bases continues.
- Distributed processing . . . almost a corollary to the above, decentralized DP remains a long-term thrust of users and those who supply them.
- Small business computing . . . as costs drop, new strata of users are brought to market, with service companies competing for the dollars.

Merchants of the solutions these trends demand may have to compete harder, but there will be plenty of demand for their products and services.

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The participants

Despite the exit of Xerox and Singer -- and the eternal cloud of legal uncertainty, reviewed in the last EDP Industry Report (4/21/76) -- the mainframe industry as a whole did well in 1975. And first quarter returns for 1976 look better.

Total computer shipments topped $11.5 billion in 1975 and should hit almost $13 billion this year. Significantly, much of this growth represents real addition to the equipment base -- as "net add" (ship minus retire) in 1976 reaches its highest percentage of shipments since before the 360 to 370 conversions. As a result, by 1980 almost $125 billion worth of computers will be installed worldwide.

And the major suppliers of those systems will be the mainframers. With the user-oriented demand trends in mind we look at them:

IBM, the leader when users and marketing come to mind, will set the pace. Last year the Giant's rental base leveled as users continued heavy outright purchases, partly as a result of purchase-to-lease price adjustments by IBM and partly out of conviction that the 370 is still a safe investment. IBM computers are heavily utilized -- two shifts a day average -- and a new line of upgrades/replacements compatible with current user software would be well received. Along those lines, IBM announced the 370/168 "Attached Processor System" -- a hardware-only extension of the 168 that links the top of IBM's uniprocessor line with the bottom of its multiprocessors. Other 370 additions or replacements are likely this year. Meanwhile the Giant continues its commitment to data base processing, telecommunications, and distributed computing with upgrades to the 3791, 3705, and MVS software, new disk systems, renewed autotransaction vigor, Satellite Business Systems . . . and the steady infusion of System/32s into new computer markets.

Honeywell, on a base of steadily increasing shipments of Series 60s, managed to maintain profit margins and decrease debt to capitalization while making news on three fronts: 1) In Europe, HIS consummated its merger with CII and in one fell swoop increased its market share a point or two. 2) Despite (or because of) headaches from the GE buy-up in 1970, the company adopted Xerox's abandoned mainframe business. 3) With a decent product and apparent corporate commitment, HIS reentered the ranks of serious mini vendors with its new Level 6. If the company can handle its now sprawling product line and weld its controls/computers split personality together . . . then a foothold in the dynamic European market and the hardware wherewithal -- minis and mainframes -- to really address distributed processing may pace the company well for the computer systems race into the 1980s.

Sperry Univac, with the exception of the introduction of a new multiprocessor aimed at medium-scale users (the 1100/10), kept a low profile in 1975. But Sperry users aren't a particularly volatile bunch -- a smaller portion of its base historically churns yearly than all other mainframers -- and their increasing loyalty to Sperry systems and peripherals bodes well for the company. Perhaps the biggest question . . . when and if will Sperry offer a small business system, a sub-90/30 computer to compete with the S/32 and others? Its recent unveiling (page 16) of a major new line of distributed processing terminals may hold some answers.

Burroughs, perhaps the most profitable mainframer next to IBM, surged ahead this week with the announcement of a new small system, the B 80. Prior to that the firm had unveiled the first of its "800" series -- its vehicle to the 1980s. With its loyal band of computer users, large accounting machine base, and technological leadership, Burroughs is one of the less troubled IBM competitors.

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STATUS OF WORLDWIDE COMPUTER MARKET FOR U.S.-BASED MANUFACTURERS
(Copyright 1975 by International Data Corporation)

	1975 Shipments:		In Use Yearend 1975:		
	$M	% Total	$B	% Total	1974-75 Change
IBM	6,650	57.6%	36.2	58.3%	+ 13.1%
Plug-Compat.	500	4.3	2.5	4.0	+ 13.6%
IBM Systems	7,150	61.9	38.7	62.3	+ 13.2%
HIS	820	7.1%	5.8	9.3%	+ 9.4%
Burroughs	710	6.2	3.2	5.2	+ 14.3%
Sperry U.	630	5.5	4.3	6.9	+ 10.3%
DEC	600	5.2	2.0	3.2	+ 53.8%
NCR	300	2.6	1.6	2.6	+ 14.3%
CDC	295	2.6	2.4	3.9	+ 9.1%
Others (incl. minis)	1,035	8.9%	4.1	6.6%	+ 36.7%
TOTAL	$11,540	100.0%	$ 62.1B	100.0%	+ 14.8%

Note: EDP/IR is engaged in a major project to re-evaluate the average values, categorization, and distribution of computers installed by U.S. manufacturers. Results will be published upon completion. At present, it appears the most significant difference is with Sperry Univac's installed value, which will probably be increased by some $500 million.

NCR, currently the autotransaction Giant, just this week reaffirmed its commitment to the mainframe business with the introduction of the first of a new family of technologically advanced yet Century-compatible computers called the "Criterion" series. But the company has had rough sledding phasing out of its mechanical era into electronics -- last year's and this quarter's earnings show it. Still, the company has a large base of accounting machine/small computer users, a clear market edge in autotransaction systems, and a determination to stay in the game . . . perhaps in concert with CDC in a future jointly developed computer family.

CDC, the heavyweight in mainframes, seems to have chosen the migratory way out -- concentrating on services, joint projects, and specialized application for its number crunchers. Its big Cyber 170s began shipment this year . . . and its profit picture brightened (1975 was one of only two profitable years in the last six). But as the services sector of the business grows -- and it's growing faster than the mainframe industry-- and CDC's systems revenue drops as a percentage of its overall take, that bleak fiscal history may change. Certainly CDC's push in peripherals, minis, and, some say, eventually in plug-compatible CPUs, will help.

. . . and others

As CDC's blending of solutions and systems illustrates, filling the users' needs entails more than shipping systems. Last year, for instance, just the six mainframers mentioned above tallied computer-related revenues over $18 billion. Add to that the revenues from third-party leasing firms, computer services, and minicomputer makers and the sum easily totals more than twice IBM's $11.5 billion computer-related revenues . . . a fact not likely to be lost on IBM's legal team.

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GETTING READY FOR THE BICENTENNIAL : NEW PRODUCT FIREWORKS

It's almost as if they wanted to clear out the back lot -- like auto dealers before the new models come in -- by infusing the mostly-old with a little new and thereby stretching the product line and development dollars. Indeed, it's been a heady trimester for new -- and, in some cases, anomalous -- products from the mainframers (NCR and Burroughs come to mind especially). Alphabetically:

Burroughs announced (4/30) the 32-81 KB B 730, featuring display-based data entry. Two weeks later (4/12) the company added four models to the top of the 7700 line by adding: 1) a new high-speed memory system with the same logic circuitry as the new B 800s, 2) a new I/O module, and 3) a new datacomm subsystem with larger memory, higher-speed data links and autonomous function. The new 7700s also function with the high-speed peripherals announced with the 800s.

CDC announced (3/30) the Cyber 18 family of mini-based systems and terminals geared for the distributed DP market. From $40K for a remote terminal to $115K for a dual-CPU timesharing system with up to 32 terminals, the minis come with microprogrammed MOS memory of 8-524 KB. (One model is based on CDC's System 17.)

DEC, counterbalancing the DEC 2040 announcement in January, announced (3/23) a new line-topper, the 1088. A basic system has two KL10 CPUs, 256K of 36-bit/word memory, a new dual-spindle disk (86 MB/spindle), some high-speed I/O, and a 32-line communications system. While announcing the $1.25M system, DEC also announced software designed to up the batch prowess of its timesharing family.

Lowering the entry fee to the Century club, NCR announced (4/7) the 16-64 KB Century 75, for batch or on-line use, available with a 19.6 MB disk and various communications capabilities ($1680/month or $60K to buy). Concurrently, NCR reduced purchase prices on the Century 101 by 14% and on the Century 151 by 19%.

And from a user's point of view -- at least as distributed processing, data base applications, and smaller and smaller standalone systems appear over time -- such comparisons are not necessarily hypothetical any more. Each sector has its strength -- whether it's in hardware, software, applications knowledge, industry expertise, or financing.

Services companies -- of which CDC is the biggest, with only 7% of the market -- will post revenues this year of $3.1 billion. And in the process of acceding to the trends mentioned, more and more will offer remote access services, transaction processing, etc. In fact, this year for the first time less than half the services revenues will be from straight batch processing.

Instead, timesharing, on-line transaction processing, remote-batch processing and on-line data base inquiry services will take the bulk of the users' dollars. Concurrent with putting users on-line, many bureaus will also be placing hardware -- terminals, intelligent terminals, and even standalone minis -- at user sites.

This offering of hardware by services suppliers could lead to specialized new products. In addition, supermarkets, other retailers, and banks -- whether joyously or grudgingly -- are leading the way for large shipments of information appliances. Other industries are sure to follow. For instance, note:

- While the number of general-purpose terminals in use will increase from 600,000 this year to 1,500,000 by 1980 . . . special-purpose terminals

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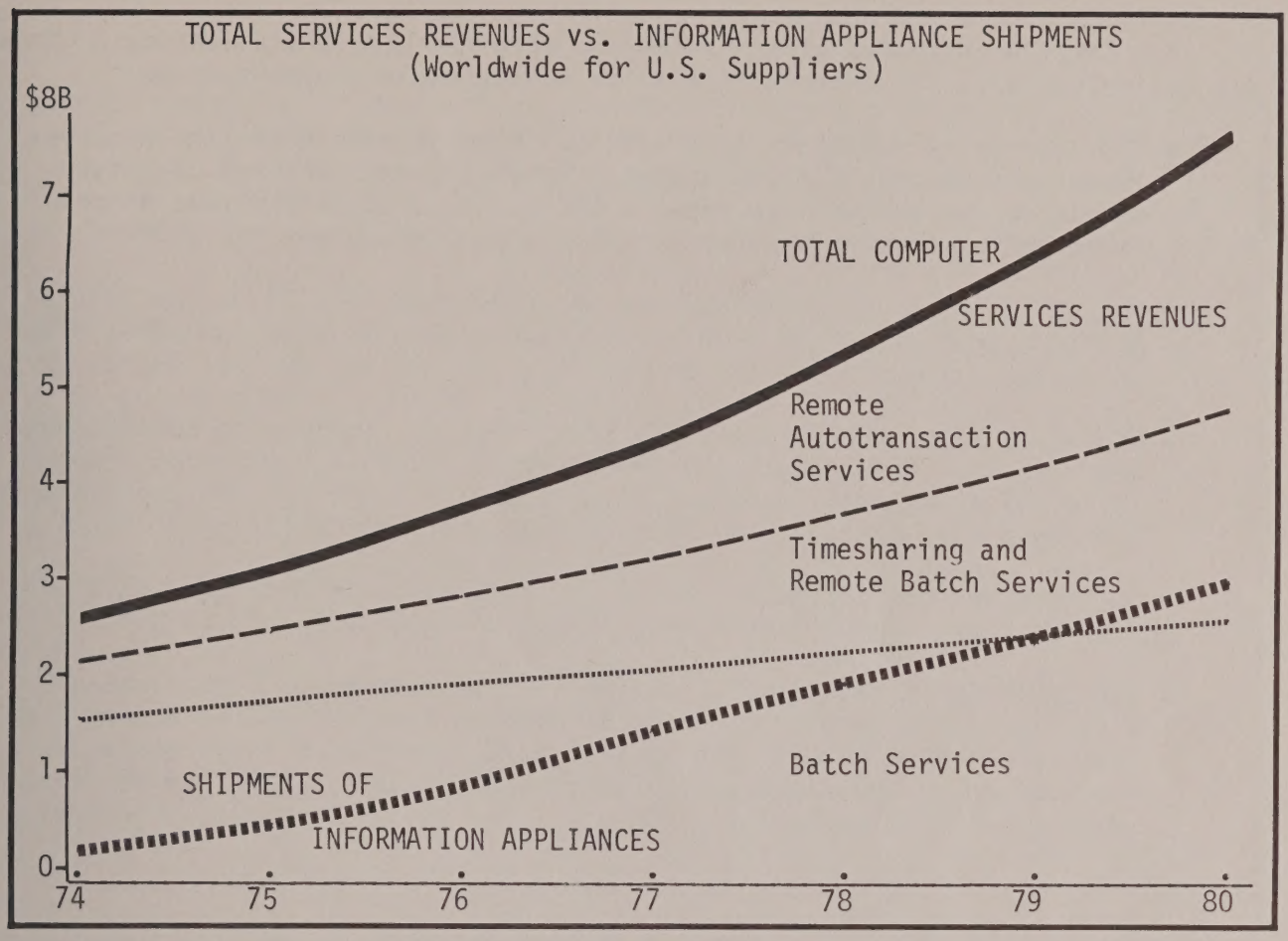

will grow even faster. POS registers, banking terminals, factory data collection devices, and the like will number over 2.3 million in 1980.

- Together, general-purpose and special-purpose terminals will represent a user investment of $25 billion by then -- almost $20 billion of which will be shipped in the next five years.

The comparison of services revenue and information appliance shipments is shown above. As the numbers show -- and as do the other numbers in this issue -- users gearing for the 1980s will have before them a glittering array of products and services to choose from, some complementing one another, some competing.

MINICOMPUTER REVENUES DIP, THEN REBOUND -- INDUSTRY STRETCHES TOWARD $2 BILLION AS IMPROVED ECONOMY, REVITALIZED OEM SECTOR, TECHNOLOGICAL MOMENTUM ALL ADD UP

As the recovery progessed during 1975, the mini industry set itself aright. A growth rate that had dropped in half one year (62% in 1974, 27% in 1975) promises now to regain almost half that distance. So 1975, with mini revenues hitting $1.4 billion was good . . . 1976, targeted for $1.9 billion, will be even better.

Spurring the rebound -- besides the industry's natural resiliency and technological momentum -- was the original equipment manufacturer (OEM) market. Although last year this sector accounted for only 40% of the value of minis shipped to U.S. destinations . . . still it gobbled up two thirds the units produced. It's a bedrock market, but one that's sensitive to inventory levels, money costs, and customer product cycles . . . in other words, the economy.

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But if 1976 estimated growth rates and earnings health are wearing a nostalgic early-70s look, the industry itself is nevertheless changing shape:

- The line-up of suppliers is evolving. With heavyweights like Honeywell Texas Instruments, and CDC applying renewed commitment and corporate muscle to the market (see pages 2 and 4, for example), market shares could be in for some substantial revisions between now and 1980.

- Product lines are stretching. At the same time PDP-11/70-type "superminis" were hitting the streets last year, vendors were expanding downward with products like the DEC LSI-11, TI 990, and DG "Micronova."

- Minis are getting more sophisticated. Vendors continue to add software and support. As a result, by 1980 service revenues will account for fully 20% of all mini revenues -- up from 13% in 1974. The average end-user unit will cost $45K by then; an OEM unit only a fifth of that.

- Applications are changing. By 1980, small business computers will use over half the minis shipped; today they use only about a third.

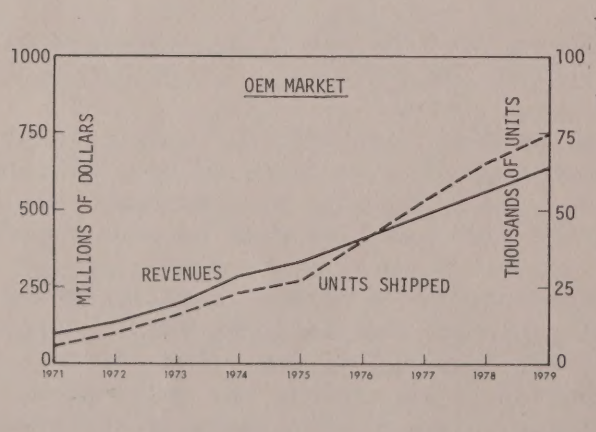
- IBM is/isn't in the market. Though the System/7 et al often compete with minis, IBM hasn't historically been in the business as others know it. But as mini makers come up with S/32 competitors (some claim 370 competitors as well) and sell them through systems houses and distributorships, IBM is marketing 5100s . . . and inventing their successors.

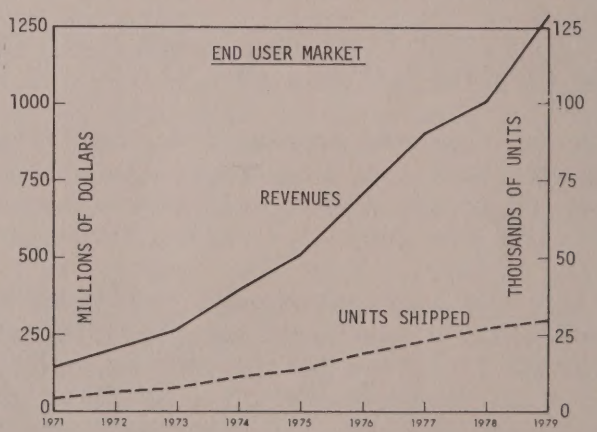
Minis vs Group B

Throughout these pages EDP/IR refers to both dedicated-application computers (Group B) and minicomputers, often in a similar context. But the two are not interchangeable. Dedicated-application computers are those toted up semiannually in EDP/IR's Group B census (see page 11) . . . and pretty much include all those computers that aren't contained in the General-purpose (Group A) census.

Minicomputers, on the other hand, though a subset of Group B, are more rigidly defined by IDC, publisher of EDP/IR, as:

OEM/END-USER MINICOMPUTER SHIPMENTS AND REVENUES
(Copyright 1975 by International Data Corporation)





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WORLDWIDE COMPUTER MARKET (U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1970	23,100	105,800	$ 6,715	$ 34.3
1971	27,800	129,200	7,077	38.6
1972	40,900	160,300	8,500	42.5
1973	54,130	204,800	9,570	47.9
1974	63,640	258,300	11,335	54.1
1975	74,650	324,600	$ 11,540	$ 62.1
1976	104,300	416,800	$ 12,750	$ 71.7
1977	142,500	549,100	14,850	82.6
1978	171,000	707,800	17,100	94.8
1979	197,000	889,900	19,500	108.4
1980	225,000	1,099,000	22,200	123.5
		UNITED STATES		
1970	14,600	68,300	$ 3,920	$ 23.0
1971	17,600	83,200	4,177	25.1
1972	27,400	104,000	5,360	26.8
1973	38,700	133,250	5,940	29.9
1974	44,900	168,800	7,040	33.6
1975	52,800	211,900	$ 6,685	$ 37.8
1976	72,800	270,500	$ 7,350	$ 43.1
1977	97,200	354,400	8,510	49.0
1978	114,100	450,800	9,710	55.6
1979	131,100	558,500	10,930	62.8
1980	150,400	680,000	12,250	70.7
		INTERNATIONAL		
1970	8,500	37,500	$ 2,795	$ 11.3
1971	10,200	46,000	2,900	13.5
1972	13,500	56,300	3,140	15.7
1973	15,430	71,550	3,630	18.0
1974	18,740	89,500	4,295	20.5
1975	21,850	112,700	$ 4,830	$ 24.3
1976	31,500	145,300	$ 5,400	$ 28.6
1977	45,300	194,700	6,340	33.6
1978	56,900	257,000	7,390	39.2
1979	65,900	331,400	8,570	45.6
1980	74,600	419,000	9,950	52.8

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GENERAL-PURPOSE COMPUTER MARKET (GROUP A)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1970	12,000	74,800	$ 6,300	$ 32.4
1971	14,300	85,200	6,700	36.3
1972	18,300	94,800	8,000	39.8
1973	20,230	106,800	8,800	44.5
1974	14,320	112,400	10,100	49.5
1975	17,650	122,600	$ 9,940	$ 56.0
1976	28,300	143,000	$ 10,550	$ 63.5
1977	38,000	173,500	12,000	71.6
1978	37,000	200,000	13,600	80.4
1979	34,000	221,000	15,300	89.9
1980	33,000	240,000	17,100	100.0
		UNITED STATES		
1970	5,700	43,800	$ 3,600	$ 21.5
1971	7,600	49,200	3,900	23.3
1972	10,700	54,000	5,000	24.7
1973	14,000	62,250	5,400	27.3
1974	8,900	65,600	6,200	30.2
1975	12,400	71,900	$ 5,615	$ 33.5
1976	17,300	84,200	$ 5,850	$ 37.4
1977	22,000	102,000	6,600	41.5
1978	19,000	115,500	7,400	45.9
1979	17,000	125,000	8,200	50.6
1980	16,000	132,000	9,000	55.5
		INTERNATIONAL		
1970	6,300	31,000	$ 2,700	$ 10.9
1971	6,700	36,000	2,800	13.0
1972	7,600	40,800	3,000	15.1
1973	6,230	44,550	3,400	17.2
1974	5,420	46,800	3,900	19.3
1975	5,250	50,700	$ 4,300	$ 22.5
1976	11,000	58,800	$ 4,700	$ 26.1
1977	16,000	71,500	5,400	30.1
1978	18,000	84,500	6,200	34.5
1979	17,000	96,000	7,100	39.3
1980	17,000	108,000	8,100	44.5

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DEDICATED-APPLICATION COMPUTER MARKET (GROUP B)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1970	11,100	31,000	$ 415	$ 1.9
1971	13,500	44,000	377	2.3
1972	22,600	65,500	500	2.7
1973	33,900	98,000	770	3.4
1974	49,320	145,900	1235	4.6
1975	57,000	202,000	$ 1600	$ 6.1
1976	76,000	272,800	$ 2200	$ 8.2
1977	104,500	375,600	2850	11.0
1978	134,000	507,800	3500	14.4
1979	163,000	668,900	4200	18.5
1980	192,000	859,000	5100	23.6
		UNITED STATES		
1970	8,900	24,500	$ 320	$ 1.5
1971	10,000	34,000	277	1.8
1972	16,700	50,000	360	2.1
1973	24,700	71,000	540	2.6
1974	36,000	103,200	840	3.4
1975	40,400	140,000	$ 1070	$ 4.3
1976	55,500	186,300	$ 1500	$ 5.7
1977	75,200	252,400	1910	7.5
1978	95,100	335,300	2310	9.7
1979	114,100	433,500	2730	12.2
1980	134,400	548,000	3250	15.2
		INTERNATIONAL		
1970	2,200	6,500	$ 95	$ 0.4
1971	3,500	10,000	100	0.5
1972	5,900	15,500	140	0.6
1973	9,200	27,000	230	0.8
1974	13,320	42,700	395	1.2
1975	16,600	62,000	$ 530	$ 1.8
1976	20,500	86,500	$ 700	$ 2.5
1977	29,300	123,200	940	3.5
1978	38,900	172,500	1190	4.7
1979	48,900	235,400	1470	6.3
1980	57,600	311,000	1850	8.3

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WORLDWIDE MINICOMPUTER MARKET -- 1975 ACTIVITY
(Estimates of Units Shipped and $ Million Revenues; Copyright 1975 by IDC)

Company	Revenues	% Total	75-74 Growth	Units	% Total
Digital Equip.	$500M	37%	27%	16,500	32%
Hewlett-Packard	235	18	57	6,000	12
Data General	113	8	23	4,800	9
Honeywell	62	5	24	925	2
General Aut.	59	4	(-8)	2,700	5
Texas Instr.	55	4	6	2,700	5
Interdata	43	3	30	1,700	3
ModComp	38	3	46	875	2
Varian	37	3	9	1,000	2
CDC	30	2	100	300	1
Computer Aut.	26	2	18	5,000	10
Raytheon	23	2	28	300	1
Microdata	17	1	13	2,050	4
Harris	15	1	25	250	-
Others	97	7	3	5,900	12
TOTALS	1,350	100%	27%	51,000	100%

+ General-purpose by design; sold as a tool, not just a solution
+ Available as a system, with operating software and peripherals
+ Offered with OEM discounts; generally sold, not leased
+ Offered with a random-access memory of 4K words or more
+ Under $25,000 in base price, or in family with some members which are under $25,000 in base price

So not all Group B computers are minis -- IBM's S/7 being the most notable example. But note the ratio of minicomputer revenues to Group B shipments. In 1975 they were 85% of Group B shipments, but by 1980 they should be 98%.

Enter the "Supermini"

The mid-range mini is still the dynamo behind minicomputer and Group B shipments -- over 80% of mini system revenues in 1975. But by 1980, predicts IDC, "superminis" of the DEC PDP-11/70 class -- HP 3000s, Interdata 8/32s, Varian V75s, etc. -- will account for 37% of system revenues. Mid-range minis will be down to 54% by then, "micro-minis" will take up the slack.

Though no one foresees armies of large-scale minis replacing regular Group A mainframes en masse, their judicious use -- in distributed and transaction processing especially -- will be a growing option for the corporate user.

But instead of one-to-one replacement of 360s or 370s, the use of "superminis" is more likely to be part and parcel of a wholesale corporate reorganization to decentralized operations. As in the well-publicized case at New York's Citibank -- -- where 8 Interdata 8/32s and 6 IBM 370/145s will replace twin 370/165s -- minis will be used as tools in distributing corporate DP power to where it's needed.

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DEDICATED APPLICATION DIGITAL COMPUTER CENSUS

The data below was compiled from the best information available to IDC; questions and/or comments should be directed to Chris Whichard, Census Editor. Dedicated Application (Group B) computers are those commonly referred to as minicomputers, plus certain larger systems designed primarily for one application such as process control, data communications, or data entry. Group B computers -- though general-purpose by design -- are typically word-oriented (8, 12, 16, or 24 bits/word), usually sold outright, and predominantly programmed in machine language. Exceptions do occur, however . . . and, it seems, more and more often.

Indeed, definition is becoming increasingly more difficult, and subjective judgment is necessary. For example, office accounting machines such as Burroughs' E and L Series or TC-500, NCR's 399, or Nixdorf's 820 are excluded. Included, however, are "data entry" oriented machines such as the Eldorado 140, Four-Phase IV-40, and MAI Basic/Four, since they compete with other "minis" yet do not fit EDP/IR's description of General Purpose (Group A) computers. Note that IBM's S/32 is a Group A computer.

Price Classes: (1) $25,000 (2) $25-50,000 (3) $50-100,000 (4) $100,000 and up; Average System Value

Manufacturers with numbers or information that differs from that shown below are encouraged to contact Chris Whichard, Census Editor, with more correct or updated information. All comments are appreciated.

AS OF JANUARY 1, 1976

NAME OF MANUFACTURER	COMPUTER MODEL	NOTES	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Adage, Inc.	AGT-10 Series						4/68	32	3	35	X
	AGT-100 Series			4	100	165	1/72	21	15	36	X
	300			4	107	165	3/75	14	3	17	5
	400			2	30	37	3/74	25	5	30	5
Apeco (Cascade)	80/20	*	8	2	28	35	1/70	]	]	]	]
	80/30	*	8	2	31	40	1/70	] 150	] 75	] 225	] X
	80/40	*	16	3	46	57	1/70	]	]	]	]
Autonetics	Recomp-II		40	4	95	127	11/68	30	5	35	X
	Recomp-III		40	3	65	94	6/61	7	2	9	X
Bailey Meter	750		25	4	40	110	6/60	38	15	53	X
	755		25	4	80	130	11/61	7	2	9	X
	756		25	4	90	150	2/65	17	12	29	X
	855/15		16	4	24	135	12/72	1	9	10	5
	855/25		25	4	100	400	4/68	16	0	16	X
	855/50		25	4	100	400	3/72	6	0	6	7
	1055		32	4	250	500	3/76	1	-	1	19
Bendix	BDX-6200		20	3	25	60	5/70	40+	0	40+	NA
	BDX-9000		16	1	6	15	/71	8+	0	8+	NA
Bunker Ramo	230		15	4		134	8/63	4	-	4	X
	300		29	4		275	3/59	3	-	3	X
	330		29	4		275	12/60	6	-	6	X
	340		29	4		375	12/63	15	-	15	X
	1018		18	1		23	12/71	10	-	10	NA
	Subtotal							38	-	38	
Cincinnati Milacron	CIF-2000 Series	a	8	1	4	12	7/69	450	100	550	NA
Clary Data Systems	404	*	16	2	6	30	1/70	100	32	132	NA
Collins Radio	8311			1	15	17	1/68	NA	NA	NA	NA
	8400			4		950	11/62	25	8	33	X
	8500		32	4	200	1,000	1/67	53	16	69	X
Compiler Systems	CSI-16		16	1	11	20	11/70	80	10	90	NA
Corp.	CSI-24		24	2	15	30	12/70	35	5	40	NA
Computer Automation	108/208/808		8	1	5	11	4/68	280	30	310	X
Inc.	116		16	1	8	16	8/70	200	50	250	NA
	216		16	1	8	20	7/69	350	45	395	X
	816		16	1	10	15	12/68	40	5	45	X
	Alpha-8		8	1	3	4	5/72	]	]	]	] NA
	Alpha-16		16	1	4	9	10/71	] 3,180	] 850	] 4,030	]
	Naked Mini-8		8	1	2	3	5/72	]	]	]	]
	Naked Mini-16		16	1	3	7	10/71	] 4,250	] 860	] 5,110	] NA
	Alpha-LSI		16	1	2		12/73	]	]	]	]
	Other							1,250	380	1,630	NA
	Subtotal							9,550	2,220	11,770	
Computer Development	CD-2000		8	1	7	10	8/70	450	NA	450	NA
Computer Logic Systems	CLS-18		18	1	9	14	3/71	NA	0	NA	NA
Computer Signal Processors	CSP-30		16	3	35	80	6/70	45	NA	45	10
	MAP		32	1	14	25	6/75	10	NA	10	NA
Comtec	CT/90		16	3	50	85	1/72	NA	0	NA	NA
Comten, Inc.	20		16+2	3	35	80	3/71	35	15	50	NA
	40/45		32+4	4	93	240	8/69	36	0	36	NA
	60/65		32+4	4	138	350	9/69	14	0	14	NA
	476		32+4	4	76	280	8/75	6	0	6	NA
	3650		16+2	3	43	90	3/75	43	2	45	NA
	3670		16+2	4	71	150	3/72	145	0	145	NA
Consultronics	600 Series		24	3	31	80	10/65	180	50	230	NA
(Sc. Control Corp.)	4700		16	3	15	72	4/69	18	0	18	NA
	DCT-132		8	2	28	36	5/69	75	65	140	NA
Control Data Corp.	160		12	4	60	112	5/60	49	11	60	X
	160-A		12	4	90	225	7/61	200	65	265	X
	160-G		13	4		535	3/64	34	1	35	X
	924/A		26	4		430	8/61	26	1	27	X
	1700		16+2	4	37	160	3/66	290	180	470	X
	1700-SC		16+2	3	20	60	9/70	150	130	280	X
	System 17		16+2	2	14	39	2/74	110	165	275	NA
	8090		12	3		90	5/64	116	89	205	X
	8092		8	3		67	6/64	56	14	70	X
	G15		29	3		61	7/55	265	30	295	X
	LGP-21		32	2		42	12/62	140	35	175	X
	LGP-30		32	3	49	59	8/56	290	43	333	X
	RPC-4000		32	4	87	101	10/60	61	12	73	X
	CSC-46/136/636		15	4		280	/54	27	3	30	X
	Elbit-100		12	1	6	8	6/67	5	445	450	X
	Cyber 1000/M-1000		24	4	250	365	/68	75	40	115	NA
	Subtotal							1,894	1,264	3,158	
Data General Corp.	Nova		16	1	6	12	2/69	750	620	1,370	Neg
	Nova-800		16	1	7	18	3/71	1,330	310	1,640	125
	Nova-820		16	2	12	28	4/72	905	265	1,170	100
	Nova-840		16	2	16	45	7/73	810	235	1,045	100
	Nova-1200		16	1	6	20	12/70	4,185	1,140	5,325	400
	Nova-1210/1220		16	1	3	8	2/72	3,475	1,025	4,500	400
	Nova-1230		16	1	6	12	12/71	320	95	415	50
	Supernova		16	1	9	25	4/70	190	85	275	Neg
	Supernova-SC		16	2	16	30	6/71	220	110	330	15
	Nova-2/4		16	1	3	5	10/73	1,450	560	2,010	150
	Nova-2/10		16	1	5	14	10/73	1,180	545	1,725	100
	Nova-3/4		16	1	2	3	1/76	-	-	-	200
	Nova-3/12		16	1	12	16	1/76	-	-	-	150
	Eclipse-S/100		16	2	12	30	2/75	100	30	130	150
	Eclipse-S/200		16	2	16	45	2/75	100	30	130	100
	Eclipse-S/300		16	2	24	95	2/75	25	10	35	50
	Subtotal							15,040	5,060	20,100	2,090
Datamate Computer	DM-16		16	2	17	26	11/69	12	0	12	X
Systems	DM-70		16	1	9	15	12/70	25+	0	25+	NA
	DM-70/ROM		16	1	4	6	10/70	NA	0	NA	NA
	ECP-18		18	1	14	16	11/66	21	0	21	X
	2400		24+3	1	15			NA	0	NA	NA
Data Technology	1600		8	1	6	22	9/68	NA	0	NA	NA

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Digiac Corp.	3060			1	9	13	1/70	70	20	90	NA
	3080		25	1	20	25	12/64	14	2	16	X
	3080-C		25	2	26	37	10/67	8	2	10	X
	3090			1	5		2/74	10	0	10	NA
Digital Computer Controls	D-112		12	1	3	12	8/70	2,425	405	2,830	] 750
	D-116		16	1	3	12	2/72	3,720	695	4,415	]
Digital Equipment	PDP-1		18	4	120	136	11/60	35	6	41	X
	PDP-4		18	3		74	8/62	30	3	33	X
	PDP-5		12	2	30	36	9/63	61	29	90	X
	PDP-7		18	3		66	11/64	69	46	115	X
	PDP-8, i,l,s		12	2	8	27	5/65	5,765	3,685	9,450	X
	PDP-8/e,f,m		12	1	4	12	4/71	14,090	6,760	20,850	1,500
	PDP-9/Linc		12	2	38	48	9/66	88	46	134	X
	PDP-9 & 9L		18	2	35	50	12/66	290	160	450	X
	PDP-11-05 & 10		16	1	5/7	12	2/72	8,600	5,100	13,700	1,100
	PDP-15 & 20		16	1	3/11	16	3/70	2,850	1,510	4,360	200
	PDP-35 & 40		16	2	9/13	30	1/73	4,050	1,900	5,950	700
	PDP-45 & 50		16	3	24/32	80	4/72	1,660	640	2,300	350
	PDP-12		12	2	13	45	4/69	505	250	755	Neg
	PDP-15		18	3	15	75	2/70	500	275	775	50
	PDP-8/A						10/74	1,200	300	1,500	800
	PDP-11/70						7/75	50	10	60	NA
	LSI-11						6/75	900	100	1,000	150
	Subtotal							40,743	20,820	61,563	
Digital Scientific Corp.	Meta-4		16	3	29	90	4/70	140	15	155	10
Dynamic Research	DPC-44		24	2		36	7/68	NA	0	NA	NA
Eldorado	140/200	*	8	2	18	30	1/70	290	100	390	25
Electronic Associates Inc.	640		16	3	27	55	6/67	110	61	171	X
	1020		16	1	20	25	2/64	100	25	125	X
	8400		32	4	200	450	6/65	21	8	29	X
	Pacer-100		16	2	15	40	5/72	125	100	225	15
Electronic Processors Inc.	EPI-118		18	1	3	14	11/70	NA	0	NA	NA
	EPI-218		18	1	4	14	1/72	NA	0	NA	NA
EMR	210		12	4	94	132	4/62	9	0	9	X
	420		42	4	324	450	6/63	3	0	3	X
	2100		21	4	65	143	12/63	8	0	8	X
Foto-Mem Inc.	Centaur-100		8	1	6	20	4/70	25	0	25	NA
Four-Phase Systems	IV/40		24	3	16	55	6/63	] 1,500	] 300	] 1,800	] NA
	IV/70	*	24	3	16	60	3/71	]	]	]	]
Foxboro	Fox-1		24	4	95	260	10/72	NA	NA	NA	NA
	2/10		16	2	30	50	11/72	NA	NA	NA	NA
	2/20		16	3	50	100	9/72	NA	NA	NA	NA
General Automation Inc.	GA-18/30		16	2	18	30	7/69	620	140	760	Neg
	SPC-12		8	1	4	16	1/68	3,625	925	4,550	100
	SPC-16		16	1	8	25	5/70	4,750	900	5,650	500
	16/110		16	1	1	-	12/75	50	20	70	NA
	16/220		16	1	2	-	1/76	-	-	-	NA
	16/330		16	1	3	-	1/76	-	-	-	NA
	16/440		16	1	6	-	7/75	100	30	130	NA
GRI Computer	909 Series		16	1	4	9	1/70	320	150	470	25
	99/30		16	1	5	15	6/72	365	170	535	75
	99/40		16	1	6	17	6/72	115	50	165	25
GT&E (Tempo)	I		16	2	14	36	1/70	90	30	120	NA
	II		16	1	6	10	6/72	40	20	60	NA
	IS-7000		16	1	8	15	6/72	NA	NA	NA	NA
Harris	6024/1		24	4	69	135	5/69	22	0	22	0
	6024/3		24	3	49	90	2/70	119	0	119	0
	Slash 4		24	4	24	110	8/73	112	8	120	43
	Slash 5		24	3	16	50	5/72	273	12	285	27
	Slash 7		24	4	45	180	10/75	5	0	5	4
	Series 100			4	NA	NA	7/75	10	2	12	6
	Series 200			4	NA	NA	12/75	6	0	6	4
	Subtotal							547	22	569	
Hewlett-Packard	2107-A	e	16	2	20	40	8/68	10	10	20	X
	2100-A		16	1	7	15	6/71	7,500	3,225	10,725	700
	2100-S		16	2	16	35	8/73	1,600	1,270	2,870	350
	2114-A		16	1	10	16	5/68	505	310	815	X
	2114-B		16	1	9	15	10/68	530	185	715	X
	2115-A		16	2	15	26	11/67	240	100	340	X
	2116-A		16	2	22	32	11/66	265	200	465	X
	2116-B		16	2	24	40	8/68	450	255	705	X
	2116-C		16	2	20	45	11/69	505	95	600	X
	21-MX							600	325	925	100
	3000		16	4	100	185	11/72	135	45	180	30
	Subtotal							12,340	6,020	18,360	
HIS GE/PAC	30	b	8	1	7	35	5/69	225	50	275	NA
	312		20	4		200	3/60	27	6	33	X
	412		20	4		300	7/62	39	8	47	X
	3010	c	16	3	13	90	5/70	25	1	26	X
	3010/2	d	16	4	15	140	12/71	NA	NA	NA	NA
	4010		24	4	76	200	10/70	33	5	38	NA
	4020		24	4	79	250	2/67	200	60	260	X
	4040		24	4		120	8/64	45	20	65	X
	4050		24	4		280	12/66	23	3	26	X
	4060		24	4		340	6/65	18	6	24	X
	4070		24	4	300	1,000		NA	NA	NA	NA
	4401		24	4		235	9/74	NA	NA	NA	NA
	4402		24	4		500		NA	NA	NA	NA
	Subtotal							635	159	794	
Honeywell	19		19	4		140	5/61	3	0	3	X
	21		20	3		63	2/66	41	25	66	X
	24		24	4		200	5/63	82	3	85	X
	112		12	1	5	10	11/69	222	48	270	X
	116		16	3		65	4/68	172	35	207	X
	124		24	4	65	130	3/66	109	18	127	X
	224		24	4	75	380	3/65	55	8	63	X
	290		18	4		175	11/60	10	2	12	X
	316		16	2	8	45	6/69	1,300	715	2,015	X
	324		24	4	175	250	7/68	12	0	12	X
	416		16	2	17	43	4/67	198	130	328	X
	516		16	3	24	95	10/66	735	415	1,150	X
	632		32	4	97	450	12/68	10	4	14	X
	700 Series		16	3	16	65	6/72	1,390	900	2,290	350
	164X Series	g	16	4	144	440	12/69	20	8	28	X
	6/06		16	2	7.5	42	1/76	-	-	-	]
	6/34		16	1	2.6	18	1/76	-	-	-	] 400
	6/36		16	2	2.6	40	1/76	-	-	-	]
	Subtotal							4,359	2,311	6,670	
IBM	1710/1720		6	4		225	2/62	8	10	18	X
	1800		16+2	4	47	235	2/66	550	380	930	X
	System/7		16	3	17	60	11/71	5,475	2,025	7,500	1,000
Imlac	PDS-1		16	1	10	11	2/70	NA	NA	NA	NA
	PDS-4	h	16	1	17	21	12/73	NA	NA	NA	NA
Information Technology, Inc.	4900/5		8	1	3	5	10/70	NA	0	NA	NA
	4900/10		16	1	10	20	10/65	25	0	25	X
	4900/20		12/32	2	30	50	10/69	20+	0	20+	X
Infotronics	Mini/Maxi		16	1		25	7/70	NA	0	NA	NA
Interdata	1		8	1	4	11	9/70	235	85	320	X
	2		16	1	11	14	7/68	20	0	20	X
	3		16	1	13	20	5/67	200	5	205	X
	4		16	1	9	21	8/68	300	125	425	X
	5		16	1	11	25	11/70	80	20	100	X
	15		16	2	22	35	9/69	40	24	64	X
	16/18		16	2	15	30	8/71	3	13	16	X
	50		16+1	1	7	19	4/72	120	35	155	20
	55		16+1	2	16	40	8/72	100	30	130	20
	70		16	3	9	65	12/71	950	285	1,235	150
	74		16	2	3	34	2/73	377	73	450	65
	80		16	2	15	44	7/72	100	25	125	15
	85		16	3	23	60	7/73	50	10	60	15
	7/16		16	2	3	35	2/74	745	125	870	150
	7/32		16	3	10	73	7/74	375	75	450	50
	8/32							25	0	25	20
	6/16		16	1	2		1/76	-	-	-	NA
Interplex	System-1		16	2		47	9/70	NA	0	NA	NA
Linolex	Model A	*	8	2	10	30	8/72	75	50	125+	NA

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AS OF JANUARY 1, 1976

NAME MANUFACTURER	COMPUTER MODEL	NOTES	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Lockheed Electronics	MAC-16		16	1	11	22	3/69	315	35	350	X
	MAC-Jr		16	1	8	16	1/71	1,300	250	1,550	50
	Sue-IIIX		16	1	6	10	9/72	600	110	710	50
	Sys-III-1		16	2	42	50	1/73	400	40	440	NA
	Sys-III-2		16	3	61	70	1/75	120	35	155	NA
	Sys-III-3		16	3	84	90	7/75	35	5	40	NA
	Subtotal							2,770	475	3,245	
MAI - Basic/Four	Basic/Four	*	8	2	34	46	8/71	1,000	1,000	2,000	300
Memorex	MRX-40	*	16	4	91	180	8/72	18	18	36	X
	MRX-50	*	16	4	104	250	8/72	8	12	20	X
Microdata Corp.	400 Series		8	1	3	4	1/70	155	0	155	X
	800 Series		8	1	6	11	5/69	2,055	1,380	3,435	X
	1600 Series		8	1	5	11	2/72	3,800	750	4,550	350
	3200 Series		16	1	8	14	3/74	100	50	150	40
	Micro-1		8	1	1	3	11/74	800	120	920	400
	Subtotal							6,910	2,300	9,210	
Mini Comp	Administrator-2		16	3	35	52	12/70	NA	0	NA	NA
	MD-708		8	1	5	7	8/70	50	0	50	NA
	Multi User-E		16	3	67	85	11/70	NA	0	NA	NA
	Multi User-I		16	3	40	58	1/71	NA	0	NA	NA
Modular Computer Systems	Modcomp-I		16	1	2	9	10/71	525	225	750	NA
	Modcomp-II		16	1	4	22	3/71	455	195	650	NA
	Modcomp-III		16	2	13	44	12/70	119	51	170	NA
	Modcomp-IV		16/32	3	19	89	5/74	140	60	200	NA
	Subtotal							1,239	531	1,770	
Monroe	XI	*	32	2	21	28	5/60	250	200	450	X
Motorola Comm. Div.	MDP-1000		8	1	8	19	2/69	75	0	75+	X
	MC-6800		8	1	5			NA	0	NA	NA
Nanodata	QM-1		18	4	75	150	/73	NA	0	NA	NA
Nuclear Data, Inc.	ND-812		12	1	7	15	3/71	375	150	525	NA
Omnicomp Computer Corp.	Omnus-1		16	1	8	12	8/71	NA	0	NA	NA
Philips	P-850 Series	*	16	1	3	15	4/71	200	50+	250	NA
Prime	100		16	1	4	7	4/73	180	200	380	NA
	200		16	1	6	17	11/12	172	50	222	NA
	300		16	3	12	57	9/73	108	70	178	NA
Qantel Corp.	Quantel-V	*	8	2	14	30	6/70	80	0	80	NA
	Answer	*	8	2	12	27	5/72	120	0	120	NA
	S-1100	i	8	2	30	35	1/74	80	10	90	NA
	S-1200	i	8	2	34	42	1/74	100	20	120	10
	S-800	i	8	1	19	19	6/75	30	5	35	5
	S-900	i	8	2	25	32	6/75	30	5	35	10
Raytheon	703		16	1	13	23	10/66	179	33	212	X
	704		16	1	10	18	3/70	675	200	875	NA
	706		16	2	19	30	5/69	75	17	92	X
	PB-250		22	2	33	48	12/60	115	20	135	X
	PB-440		24	4		140	3/64	20	2	22	X
	PB-520		24	4		128	10/65	26	1	27	X
	RDS-500		16	1	8	14	12/73	175	55	230	NA
	Subtotal							1,265	328	1,593	
Redcor Corp.	RC-70		16+2	2	15	30	7/68	100	40	140	X
Rolm Corp.	1601	j	16	2	13	28	3/70	1,016	671	1,687	NA
	1602	j	16	3	18	55	2/73	126	130	256	NA
	1603	j	16	1	10	20	10/74	10	14	24	NA
	1664	j	16	3	32	75	3/76	-	-	-	NA
Sanders	Series-200		16+2	4	57	120	3/69	NA	NA	NA	X
	Series-300		16				12/71	NA	NA	NA	NA
	MIP-16		16	2	15	30		NA	NA	NA	NA
Spear	Microline		12	3	46	57	6/66	NA	NA	NA	X
Spiras Systems/USM	65		16	2	19	40	8/69	NA	NA	NA	X
Systems Computer Corp.	500		8				6/72	NA	0	NA	NA
	1000		8	1	4		1/71	400	200	600	NA
	1500		8				6/72	NA	0	NA	NA
Sys. Engineering Labs.	810		16	2	38	45	9/65	24	6	30	X
	810-A		16	3	18	90	4/67	236	10	246	X
	810-B		18	4	30	150	12/68	168	10	178	X
	840		24	3	65	80	11/65	3	0	3	X
	840-A		24	3	60	75	8/66	36	4	40	X
	840-MP		24	4	49	260	12/67	33	0	33	X
	85		32	4	150	240	7/72	25	5	30	NA
	86		32	4	200	325	6/70	50	6	56	NA
	88		32	4	350	600	3/71	6	2	8	NA
	32		32	3	25	70	8/75	-	-	-	NA
	Subtotal							581	43	624	
Tenet	210		32	4	200	385	8/71	NA	0	NA	NA
Texas Instruments	960-A&B		16	2	14	30	6/70	2,450	1,050	3,500	NA
	980-A&B		16	2	17	40	5/68	2,730	1,170	3,900	NA
	990/4		16	1	2		3/76	-	-	-	NA
	990/10		16	1	3		3/76	-	-	-	NA
Unicom Inc.	CP-8A		8	1	3		2/70	105	55	160	NA
	CP-8B		8	1	3		3/70	78	30	108	NA
	CP-8C		8	1	5		3/70	130	70	200	NA
	CP-8D		8	1	7		4/70	30	10	40	NA
	Subtotal							343	165	508	
Unicomp Inc.	Comp-16		16	2	11	29	6/70	26	0	26	X
	Comp-18		18	2	12	38	8/70	38	0	38	X
Univac (EMR)	6130/6135		16+2	4	85	200	3/66	60	38	98	X
	6140/6145		16	4	60	120	6/72	NA	NA	NA	NA
	6020		24	4	72	175	4/65	13	3	16	X
	6040		24	4	98	225	7/65	9	1	10	X
	6050		24	4	123	360	2/66	17	6	23	X
	6070		24	4	240	600	10/65	1	3	4	X
Varian	520/i		16	1	6	13	9/68	330	170	500	X
	620/a		16	3		75	12/65	120	30	150	X
	620/f		17+1	1	11	25	6/70	170	80	250	X
	620/f-100		16	1	10	22	6/72	275	125	400	NA
	620/i		16+2	1	10	20	12/65	920	380	1,300	X
	620/L & 100c		16	1	5	12	2/71	680	300	980	NA
	620/L-100		16	1	6	14	6/72	610	300	910	NA
	R-620 * 622/i		16+2	2	15	29	6/69	(140)	60	200	X
	V-72				10		2/74	250	100	350	NA
	V-73						11/72	500	220	720	NA
	V-74			3	40		5/74	80	40	120	NA
	V-75							50	20	70	NA
	V-76							NA	NA	NA	NA
	Subtotal							4,125	1,825	5,950	
Varisystems	PAC-16	k	16	1	4		9/69	NA	0	NA	X
Wang Labs	WCS/10		8	1	6.1	10	5/74	500	-	500	NA
	WCS/20		8	1	11	18	5/74	350	-	350	NA
	WCS/30		8	2	30	35	5/74	300	-	300	NA
Westinghouse	P-50		14	1	16	23	8/64	182	40	222	X
	P-250	l	16	3	40	62	9/67	48	20	68	X
	P-500 Series		18	4	85	110	6/63	33	12	45	X
	P-2000		16	2	10	27	8/69	111	90	201+	NA
	2500		16	2	10	30	11/71	110	45	155+	NA
	Subtotal							484	207	691	
Xerox	92		12	3		90	4/65	30	20	50	X
	910		24	4		120	8/62	140	40	180	X
	920		24	4		150	9/62	90	40	130	X
	925		24	4		200	12/64	10	4	14	X
	930		24	4	80	400	6/64	75	50	125	X
	CE-16 & A		16	1	8	23	6/69	35	10	45	X
	CF-16 & A	m	16	1	8	17	11/70	85	15	100	Neg
	Sigma-2		16	4	24	125	12/66	170	80	250	X
	Sigma-3		16	4	28	140	1/70	190	120	310	NA
	Subtotal							825	379	1,204	
XLO	Eight		8	1	4		1/71	NA	NA	NA	NA
TOTALS								145,507	57,257	202,764	

* primarily sold as "small business computer" and/or "inteligent terminal/data entry"
a. cross-licensed version of Microdata-800
b. cross-licensed version of Interdata-1
c. cross-licensed version of Interdata-4
d. cross-licensed version of Interdata-70
e. utilizes 2115-A or B (Educ. Basic Systems)
f. excluding 2000 and 2007 "system" configurations avoid double counting
g. utilizes two H-316s
h. interactive graphics display systems (freestanding or remote)
i. sold as standalone mini-based business system and as part of larger distributed processing network
j. software compatible with Data General/Nova
k. manufactured by Photon, Inc.
l. utilizes Xerox - Sigma-2
m. utilizes CAI-116

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General-Purpose Digital Computer (Group A) Census shown below are based on the best information available to IDC -- but are definitely estimates. Computer makers, as a rule, do not directly supply this type of data. Only through the use of IDC's extensive data files and other sources are estimates such as these possible. The computers included in Group A comprise the bulk of digital computers (by value) in operation. They are byte or character oriented -- except for large-scale scientific computers that have large words -- and are primarily programmed in higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and special-purpose machines.

Computer size classes are based on the IBM 370 product line -- rather than constantly shifting average system values -- and which of a manufacturer's models competes with which IBM machine. For example, a vendor's computer in Size Class 7 would more closely compete with an IBM 370/168 or 165 than any other IBM computer. Other classes can be readily checked under IBM's column.

AS OF JANUARY 1, 1976

NAME OF MANUFACTURER	COMPUTER MODEL	CLASS	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Amdahl	470 V/6	7	$105,000	6/75	5	1	6	10
Burroughs	B-200	3	$ 5,600	11/61	45	55	100	X
	B-300	3	$ 5,200	7/65	240	45	285	X
	B-500	3	$ 6,000	11/68	390	435	825	X
	B-70X/71X	2	$ 1,300	3/73	475	175	650	100
	B-72X	2	$ 2,000	4/75	25	-	25	100
	B-1712	2	$ 2,100	8/72	225	100	325	100
	B-1714	2	$ 2,250	8/72	445	200	645	130
	B-1718	3	$ 3,500	11/74	30	15	45	55
	B-1726	3	$ 5,900	2/73	300	110	410	60
	B-1728	3	$ 8,300	8/73	180	40	220	50
	B-2500	4	$ 8,900	2/67	110	100	210	X
	B-2700	4	$ 8,700	8/67	380	120	300	40
	B-3500	4	$ 16,000	5/67	464	264	730	X
	B-3700	4	$ 22,600	11/72	225	110	335	20
	B-45/4700	5	$ 27,300	10/71	240	100	340	20
	B-4790	5	$ 41,000	11/75	5	-	5	40
	B-5500	5	$ 35,000	3/63	55	20	75	X
	B-5700	5	$ 29,500	12/70	25	15	40	X
	B-65/6700	6	$ 57,500	11/69	100	70	170	10
	B-7700	7	$120,000	8/73	10	2	12	5
	B-7750	7	$135,000	/75	1	-	1	
	Subtotal				3,971	1,977	5,948	730
CDC	G-20	4	$ 19,600	4/61	3	3	6	X
	1604/A/8	6	$ 42,000	1/60	11	4	15	X
	31/3150	4	$ 9,100	12/74	72	45	117	X
	3170	5	$ 19,200	12/70	11	12	23	X
	3200	4	$ 14,700	5/64	43	38	81	X
	3300	5	$ 29,900	9/65	100	86	186	X
	3400	5	$ 23,700	11/64	4	7	11	X
	3500	5	$ 26,000	1/69	15	15	30	X
	3600	6	$ 49,000	6/63	15	12	27	X
	3800	6	$ 53,000	12/65	17	3	20	X
	6200	6	$ 39,000	11/70	-	6	6	X
	Cyber-72	5	$ 36,300	10/71	25	70	95	5
	Cyber-172	6	$ 41,200	7/75	4	11	15	15
	6400	6	$ 54,000	5/66	58	55	113	X
	Cyber-73	6	$ 51,700	3/72	28	35	63	2
	Cyber-173	6	$ 54,600	9/75	2	2	4	20
	6500	6	$ 74,800	12/67	20	13	33	X
	6600	7	$119,600	8/64	56	30	86	X
	Cyber-74	7	$115,500	3/72	10	6	16	1
	Cyber-174	6	$ 67,500	9/75	0	1	1	5
	Cyber-175	7	$ 84,000	8/75	2	2	4	5
	6700	7	$125,000	7/70	2	-	2	X
	7600	7	$171,600	1/69	20	6	26	X
	Cyber-76	7	$165,000	3/72	3	4	7	2
	Star-100	7	$250,000	12/73	1	1	2	1
	Subtotal				522	467	989	56
Digital Equipment Corporation	PDP-6	4	$ 10,000	10/64	14	10	24	X
	1040/1050	4	$ 13,300	10/67	240	110	350	10
	1055	4	$ 22,000	12/71				
	1060/1070/1077	5	$ 30,000	6/72	73	37	110	10
	1080/1090	6	$ 30,000	6/75	12	3	15	5
	Subtotal				339	160	499	25
HIS	Gamma 10	2	$ 2,500	7/64	-	835	835	X
	Gamma 30	4	$ 10,100	2/62	-	115	115	X
	G-5X Series	2	$ 1,650	1/66	625	2,800	3,425	X
	G-100 Series	3	$ 4,100	4/66	200	1,400	1,600	X
	G-200 Series	4	$ 14,000	4/61	140	40	180	X
	G-400 Series	4	$ 16,650	5/64	235	300	535	X
	G-615/25/35/45	6	$ 73,300	4/65	40	36	76	X
	G-6025	5	$ 22,200	11/73	35	15	50	X
	G-6030/40	5	$ 37,000	6/71	65	128	193	X
	G-6050/60	6	$ 52,000	7/71	100	55	155	X
	G-6070/80	6	$ 68,900	7/71	40	12	52	X
	G-6180	7	$102,000	2/74	3	-	3	X
	G-Subtotal				1,483	5,736	7,219	X
	H-105/115	3	$ 4,350	3/70	950	500	1,450	X
	H-110/120	3	$ 4,050	1/66	310	240	550	X
	H-125	3	$ 8,400	12/67	50	215	265	X
	H-200	3	$ 6,500	3/64	340	195	535	X
	H-2020	3	$ 2,400	2/73	510	80	590	X
	H-2030	3	$ 5,150	1/73	100	30	130	X
	H-2040	4	$ 9,900	4/72	335	115	450	X
	H-1015	4	$ 12,750	4/71	75	50	125	X
	H-2050	4	$ 14,800	4/72	200	75	275	X
	H-12/1250	4	$ 12,700	2/66	270	125	395	X
	H-2105	4	$ 18,300	2/71	95	45	140	X
	H-2060	4	$ 21,000	4/72	90	25	115	X
	H-2200	4	$ 20,000	1/66	110	40	150	X
	H-2070	5	$ 25,300	5/72	65	5	70	X
	H-3200	5	$ 27,400	2/70	80	25	105	X
	H-4200	5	$ 31,600	9/68	20	3	23	X
	H-2088	6	$ 44,900	/72	5	1	6	X
	H-8200	6	$ 74,500	2/69	20	4	24	X
	H-4/1400	4	$ 13,500	12/61	15	20	35	X
	H-800	5	$ 29,100	12/60	24	10	34	X
	H-1800	6	$ 46,900	7/64	7	4	11	X
	H-Subtotal				3,671	1,807	5,478	X
	Series 60							
	61/58	2	$ 1,950	1/75	90	225	315	200
	61/60	2	$ 3,300	1/75	60	220	280	
	62/40	2	$ 3,800	1/75	20	10	30	400
	62/60	3	$ 4,300	1/75	45	35	80	
	64/20	3	$ 7,400	1/75	25	45	70	290
	64/40	4	$ 12,700	1/75	5	15	20	
	66/10	4	$ 18,300	1/75	15	10	25	
	66/20	5	$ 23,300	1/75	55	40	95	200
	66/40	5	$ 36,200	1/75	60	80	140	
	66/60	6	$ 48,800	1/75	50	10	60	
	66/80	7	$ 90,000	1/75	10	3	13	5
	68/80	7	$100,000	1/75	2	-	2	
	Subtotal Series 60				437	693	1,130	1095
	HIS Total				5,591	8,236	13,827	1095

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AS OF JANUARY 1, 1976

NAME MANUFACTURER	COMPUTER MODEL	CLASS	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
IBM	System/32	1	$ 900	3/75	5,000	450	5,450	10,000
	System 3/6	2	$ 1,750	12/70	2,750	1,500	4,250	X
	System 3/8	2	$ 1,900	6/75	1,200	400	1,600	1,500
	System 3/10	2	$ 2,550	1/70	16,700	7,600	24,300	X
	System 3/12	2	$ 3,250	3/76	-	-	-	500
	System 3/15	3	$ 4,650	3/74	2,850	700	3,550	1,500
	Subtotal				28,500	10,650	39,150	13,500
	370/115	3	$ 7,450	4/74	1,465	1,280	2,745	500
	370/125	4	$ 11,250	6/73	2,035	1,670	3,705	250
	370/135	4	$ 17,500	5/72	2,685	1,940	4,625	100
	370/145	5	$ 31,700	7/71	1,900	1,300	3,200	60
	370/155	6	$ 60,300	2/71	530	430	960	X
	370/158	6	$ 67,500	5/73	920	522	1,442	500
	370/165	7	$102,000	6/71	115	63	178	X
	370/168	7	$126,000	7/73	275	115	390	140
	370/195	7	$198,500	3/71	16	4	20	X
	Subtotal				9,941	7,324	17,265	1,550
	360/20	3	$ 3,675	12/65	1,735	4,050	5,785	X
	360/22	3	$ 5,900	7/71	310	215	525	X
	360/25	3	$ 7,650	10/68	225	860	1,085	X
	360/30	4	$ 11,400	6/65	2,340	2,000	4,340	X
	360/44	4	$ 14,500	7/66	47	54	101	X
	360/40	4	$ 20,000	6/65	1,175	1,495	2,670	X
	360/50	5	$ 32,700	8/65	555	460	1,015	X
	360/65	6	$ 70,700	11/65	405	200	605	X
	360/67	7	$114,200	6/66	27	13	40	X
	360/75	7	$ 95,900	1/66	28	14	42	X
	360/85	7	$143,800	10/69	5	3	8	X
	360/95	7	$153,000	11/67	13	2	15	X
	Subtotal				6,865	9,366	16,231	X
	1130	2	$ 2,350	2/66	2,000	1,665	3,665	X
	1401	3	$ 3,775	9/60	750	880	1,630	X
	1401-G	2	$ 2,350	5/64	45	24	69	X
	1401-H	2	$ 1,325	6/67	14	37	51	X
	1410	4	$ 17,350	11/61	70	45	115	X
	1440	3	$ 4,800	4/63	125	160	285	X
	1460	4	$ 10,000	10/63	30	32	62	X
	1620	3	$ 2,750	9/60	235	220	455	X
	7010	5	$ 26,500	10/63	9	6	15	X
	7030	7	$163,200	5/61	3	1	4	X
	704	5	$ 32,600	12/55	1	1	2	X
	7040	5	$ 25,500	6/63	8	15	23	X
	7044	5	$ 37,200	6/63	8	5	13	X
	705	5	$ 38,800	1/56	2	2	4	X
	7070-74	5	$ 27,500	3/60	100	30	130	X
	7080	6	$ 61,200	8/61	40	-	40	X
	7090-94	6	$ 71,900	8/60	50	10	60	X
	Subtotal				3,490	3,133	6,623	X
	Total IBM				48,796	30,473	79,269	15,050
NCR	8200	1	$ xx,xxx	9/75	275	175	450	600
	Century-50	2	$ 2,050	2/71	970	125	1,095	X
	Century-100	3	$ 2,980	9/68	565	900	1,465	X
	Century-101	3	$ 2,850	10/72	1,320	290	1,610	300
	Century-151	3	$ 3,500	2/75	100	40	140	75
	Century-200	4	$ 8,000	9/69	510	375	885	X
	Century-201	4	$ 10,000	8/74	220	25	245	70
	Century-251	4	$ 10,000	11/73	100	25	125	40
	Century-300	5	$ 22,600	2/72	55	30	85	2
	304	4	$ 10,000	1/60	4	-	4	X
	310	2	$ 1,000	5/61	12	10	22	X
	315	3	$ 5,000	5/62	250	225	475	X
	315-RMC	4	$ 11,800	9/65	40	45	85	X
	390	2	$ 800	5/61	15	100	115	X
	500	2	$ 1,150	10/65	590	1,350	1,940	X
	Subtotal				5,026	3,715	8,741	1,087
Philco	1000	3	$ 7,000	6/63	8	1	9	X
	210/211	5	$ 40,000	10/58	5	1	6	X
	212	5	$ 52,000	1/63	4	1	5	X
	Subtotal				17	3	20	X
Singer	System 10	2	$ 2,250	10/70	1,950	1,642	3,592	X
Standard Computer	IC-4000	3	$ 9,000	9/68	4	-	4	X
	IC-6000	4	$ 16,000	5/67	3	-	3	X
	IC-7000	4	$ 17,000	6/69	7	-	7	X
	Subtotal				14	-	14	X
Sperry Univac	I/II	4	$ 26,500	3/51	5	2	7	X
	III	4	$ 26,900	8/62	90	35	125	X
	SS-80/90	3	$ 8,500	8/58	5	15	20	X
	418-I/II/III	4	$ 14,500	6/63	102	110	212	X
	491/492	5	$ 28,600	12/61	14	7	21	X
	494	6	$ 44,300	2/66	50	45	95	X
	1004	2	$ 1,100	2/63	610	700	1,310	X
	1005	2	$ 1,730	4/66	490	185	675	X
	1050	3	$ 9,325	9/63	140	110	250	X
	1106	6	$ 42,400	12/69	90	150	240	10
	1107	6	$ 60,400	10/62	6	13	19	X
	1108	7	$ 72,800	9/65	130	105	235	X
	1110	7	$ 90,100	6/72	55	55	110	5
	9200	2	$ 2,530	6/67	1,000	900	1,900	X
	9300	3	$ 4,300	9/67	750	850	1,600	X
	9400	4	$ 12,300	5/69	200	300	500	X
	9700	5	$ 22,900	8/72	10	15	25	X
	90/30	4	$ 8,700	2/75	250	160	410	600
	90/60	5	$ 17,200	1/74	80	60	140	125
	90/70	5	$ 23,300	11/73	15	35	50	30
	1100/10	5	$ 35,000	4/76	-	-	-	50
	1100/20	6	$ 43,300	4/75	10	5	15	40
	1100/40	7	$113,300	7/75	2	1	3	35
	Subtotal				4,104	3,858	7,962	895
	301	4	$ 7,060	10/60	73	8	81	X
	501	5	$ 17,100	6/59	7	-	7	X
	3301	5	$ 24,100	7/64	51	-	51	X
	Spectra 70/15	3	$ 4,200	9/65	9	-	9	X
	Spectra 70/25	3	$ 7,400	9/65	1	1	2	X
	Spectra 70/35	4	$ 13,000	1/67	83	4	87	X
	Spectra 70/45	5	$ 24,000	11/65	221	10	231	X
	Spectra 70/46	5	$ 40,400	11/68	30	1	31	X
	Spectra 70/55	5	$ 38,400	11/68	6	-	6	X
	Spectra 70/60	6	$ 44,500	9/70	18	-	18	X
	Spectra 70/61	6	$ 50,000	3/71	9	-	9	X
	Spectra 1600	3	$ 3,800	1/69	63	-	63	X
	Spectra 70/2	4	$ 12,600	7/71	85	-	85	X
	Spectra 70/3	4	$ 20,400	10/71	19	-	19	X
	Spectra 70/6	6	$ 32,200	10/71	45	2	47	X
	Spectra 70/7	6	$ 39,900	10/71	21	-	21	X
	Subtotal				741	26	767	X
	Total Sperry Univac				4,845	3,884	8,729	895
Xerox	Sigma-5	4	$ 12,650	8/67	245	55	300	X
	Sigma-6	4	$ 20,000	11/70	38	8	46	X
	Sigma-7	5	$ 24,700	12/66	85	20	105	X
	Sigma-8	4	$ 19,000	9/71	15	10	25	X
	Sigma-9	6	$ 44,000	11/71	50	21	71	X
	530	3	$ 3,500	8/73	250	60	310	40
	550	3	$ 7,525	11/74	50	15	65	20
	560	4	$ 17,030	11/74	25	3	28	5
	940	5	$ 24,000	4/66	50	4	54	X
	9300	3	$ 8,500	11/64	18	4	22	X
	Subtotal				826	200	1,026	65
TOTAL					71,902	50,758	122,660	19,003

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• THE U.S. CHALKED UP A FAVORABLE BALANCE OF TRADE IN COMPUTERS, says the Department of Commerce. While business machines as a whole dropped 4.1% to a balance of $1.7 billion for 1975, computers and related equipment (84% of U.S. business machines exports in 1975) stayed steady with a balance of $2.1 billion. Exports of computers and related gear reached $2.2 billion; imports $128 million. Canada, with $320 million of U.S. exports, was the principle customer. West Germany followed with $274 million; the U.K. with $270 million, France with $223 million, and Japan with $189 million. Eastern Bloc nations imported $39.4 million. Caution is advised, however: DOC figures cover only that equipment manufactured in the U.S. by U.S. firms . . . many also manufacture equipment in other countries.

• SPERRY UNIVAC IS HOPPING ON THE DISTRIBUTED PROCESSING BANDWAGON with a new, currently three-membered family of intelligent terminals. First on the list is the 36 KB programmable UTS 400. These terminals can be clustered in various ways and are compatible with Sperry's Uniscope 100 and 200 terminals; various peripherals, including cassettes, diskettes, printers and multiplexors are available. The rental prices range from $273 a month for a one-station setup to $938 for a six station net. A special-purpose version called the UTS 400 Text Editor was also Meant for use by printers and publishers, it comes with specially microcoded ROM chips and 8K to 16K of RAM.

The third member of the family is the UTS 700 intelligent remote-batch terminal. Using LSI and MOS semiconductor technology, the disk-based UTS 700 features concurrent remote-batch terminal emulation and batch operation, disk file maintenance, system control language, and error logging. An RPG compiler and various utility programs are available as well. The UTS 700 is bus-oriented, comes with 65 KB of directly-addressable main memory, diskette (both single and double density) storage, cartridge disk capability, and the capacity for attachment to various readers, printers, and CRTs. A typical monthly rental price for a UTS 700 is $1709, purchase price $59K.

• IN TIME FOR MOTHERS DAY, a Virginia appeals court last week blocked the FCC's registration program for interconnect devices which would have allowed for the interfacing of computer terminal equipment (and eventually private PBXs) into the Bell system without the use of protective devices. The twelfth-hour stay gives AT&T a breather in its efforts to parry FCC rulings -- starting with the Carterfone decision in 1968 -- aimed at increasing competition in the communications marketplace. AT&T is currently lobbying in Congress for new laws that would diminish the effect of the FCC's Carterfone and Specialized Carrier decisions . . . much to the detriment (perhaps even dissolution) of the likes of MCI, Datran, etc.

• ON THE HAPPY SIDE OF DATACOMM, Intertel says it has a "network control system" that can test and restore communications networks on-line. Key to the NCS4000, as it is called, says the modem maker, is an ability to pass test signals around hub sites -- where multiplexors, concentrators and such prevent analog signals from reaching a test site. Thus diagnostics can be run without shutting down the line. NCS4000s, available this month, will cost between $50,000 and $100,000.

• FIRST QUARTER RESULTS OVER FIRST QUARTER 1975: IBM revenues up 17%, earnings up 26%; Honeywell revenues up 5%, earnings up eleven-fold; Sperry revenue up 9% (5% for FY; 11% computers only), earnings up 12% (16% for FY); Burroughs revenue up 11%, earnings up 4%; NCR revenues down 2%, earnings down 37%; DEC revenues up 42%, earnings up 67%. Many of the earnings statements were affected by changes in accounting standards adopted in 1975; revenues were not affected.

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Paul Arabasz

Review and Forecast

EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" APRIL 30,1975 • VOL.10,NO.15&16 P.J.McGOVERN,PUBLISHER

At the watershed

SHIPMENTS BREAK RECORDS, DESPITE RECESSION, AS SIGNIFICANT CHANGES APPROACH

During 1974, the computer industry set some shipment milestones as it proved it is at least recession resilient when caught at the proper point in its product cycle. General-purpose hardware shipments edged above the $10 billion mark for U.S.-based manufacturers; minicomputer revenues to U.S. firms topped the $1 billion level for the first time and promised to keep growing.

So as 1975 rolls by and the economy improves, the computer industry enters a slight holding pattern . . . but not for too long. The industry is destined for still more significant change during the next few years. Indeed, the triggers of this change are cocked:

- The main legal event -- U.S. vs. IBM -- is scheduled to begin May 19 with IBM riding rather high on its present guiltlessness before any court. The trial's outcome eventually will determine the structure of the information processing industry.

- A new product cycle -- whether the highly glamorized FS promised by IBM in the "Telex documents" or just a new round of hardware that will gradually lead to new applications -- is likely soon to be unveiled. Some of the equipment for the late 1970s, in fact, is already here.

- Generations of various type products -- data entry and mass storage peripherals as well as CPUs and main memory -- are stimulating user acquisition patterns that eventually will smooth out shipment curves.

- Sparked by IBM's System/32, the market for small business computers -- and/or smart office machines -- will bring data processing (and some DP equipment in most cases) but no DP managers to a whole new strata of user organization.

- Market and product definitions are about to change as services compete head-on with products . . . as networks, microprocessors, and mass memories provide the basis for true distributed computing.

- In the face of such change, the nature of most mainframe companies will change significantly as they find and establish safe identities.

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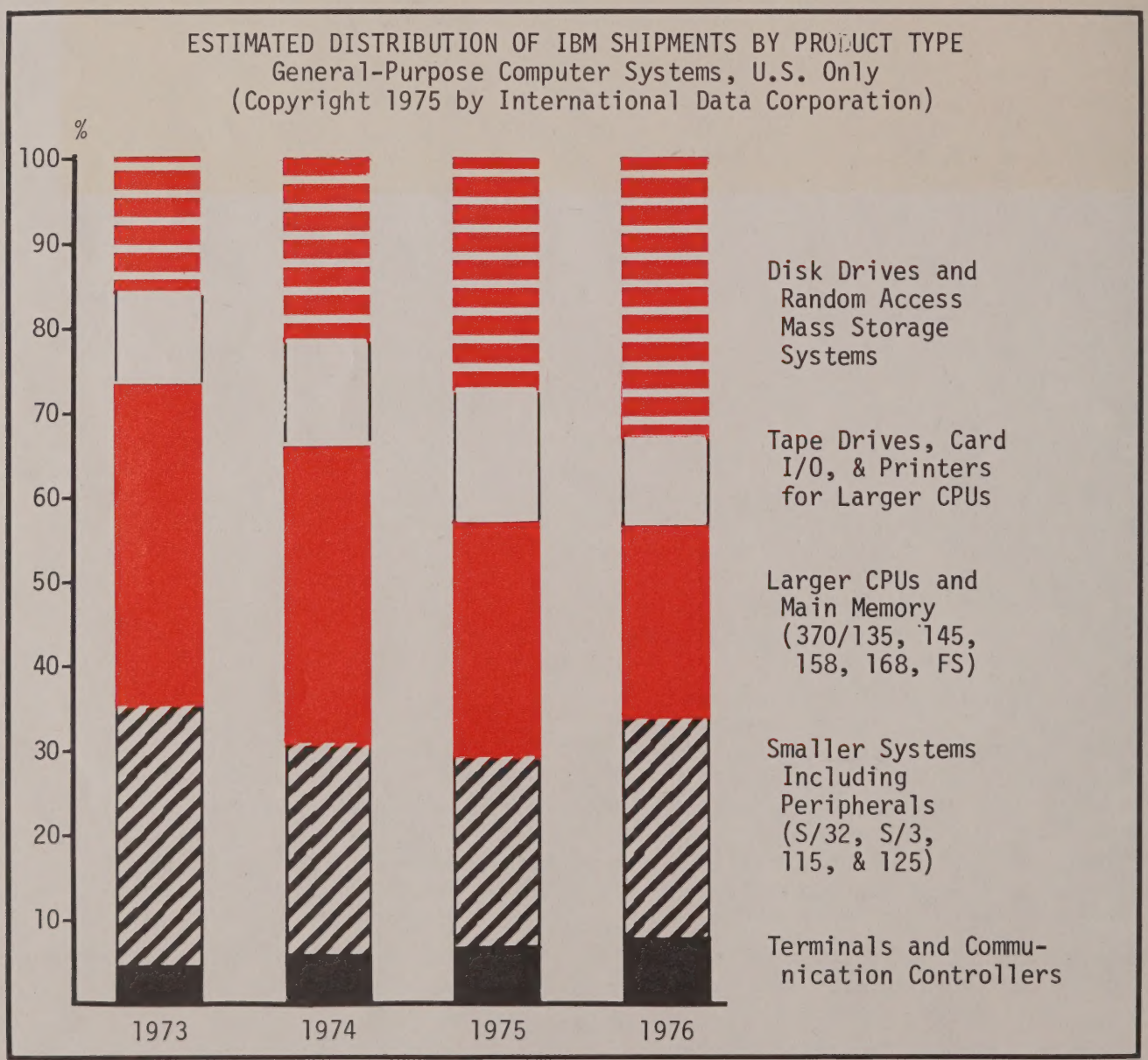
The how and the why of this change -- in many cases -- looks as much like a strategy for survival in the face of a split-up IBM as it does like anticipatory response to the technology of the 1980s. In any event, it is important to take a quick look at each of the major mainframers; and in most cases developments are best related to similar situations with IBM.

The product cycle(s)

The bar chart below -- EDP Industry Report's estimate of how IBM's hardware shipments within the U.S. vary by year during the current time period -- illustrates several aspects of the product cycle(s) going on.

- The use of telecommunications continues to grow. The numbers behind these charts don't even include information appliances (page 15).
- Small systems continue to be important as they spread the customer base further down the pyramid.



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STATUS OF WORLDWIDE COMPUTER MARKET FOR U.S.-BASED MANUFACTURERS
(Copyright 1975 by International Data Corporation)

	1974 Shipments:		In Use Yearend 1974:		
	$M	% Total	$B	% Total	1973-74 Change
IBM	6,960	62.0%	32.0	59.1%	+ 10.2%
Plug-Compat.	735	6.5	2.2	4.1	+ 34.8%
IBM Systems	7,695	68.5	34.2	63.2	+ 11.5%
HIS	685	6.1%	5.3	9.8%	+ 5.2%
Univac	590	5.3	3.9	7.2	+ 8.1%
Burroughs	565	5.0	2.8	5.2	+ 23.1%
DEC	430	3.8%	1.3	2.4%	+ 36.4%
NCR	320	2.9	1.4	2.6	+ 18.8%
CDC	230	2.0	2.2	4.1	+ 9.3%
Others (incl. minicomputers)	720	6.4	3.0	5.5	+ 35.3%
TOTAL	$11,235M	100.0%	$ 54.1B	100.0%	+ 12.9%

- Mass storage is booming -- from the changeover within removable disk technology as well as the expected move to mass storage systems.

- Large computer shipments will definitely need a stimulus by 1977.

Because of factors such as these, EDP/IR has assumed that shipments of new IBM central processors -- whatever they are called -- will begin late in 1976 and be a significant factor in shipments beginning in 1977. The General Purpose forecast (page 10) assumes this. Is it FS? That's a more difficult question. IBM said on March 13:

> FS was a label that meant "Future Systems." The label is no longer in use, but that in no way implies that our development efforts on products for the future have stopped.

This is the statement from which stems "announcements of the cancellation of FS!" As far as EDP/IR is concerned, a programmerless, English-language computing system -- as many seem to think FS was supposed to be -- won't be implemented in 1977. A new round of CPU/memory hardware will be here. And much of the next hardware round could well be used to implement a future type approach to computing.

Meanwhile, the other mainframers are proceeding along paths similar to at least some aspect of what IBM seems up to. We'll take a quick look:

Other than IBM, there are really only three full-fledged general-purpose computer systems manufacturers left in the race -- Burroughs, HIS, and Univac. (And there are even rumors that one of these could be retreating.) The others do their own thing: Control Data continues on its announced plan to be a services company; NCR emerges as the leading autotransaction company; DEC continues -- successfully -- to market mass-produced hardware and timesharing computers.

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Burroughs -- as it goes its own way -- continues to make the best gains of any mainframer. Shipments last year increased 24% to its core of loyal users and others who have opted for the Burroughs approach to multi-processing. In addition, the company has a viable approach -- via the L Series electronic machine or the B 700/1700 route -- for accounting machine users who want or need to upgrade to true EDP. What's more, the company's TC terminal computers are popular outside its base of mainframe users.

One of the major challenges Burroughs will face during the next few years is to protect its huge accounting machine base from the onslaught of IBM's System/32. At present, there is no user data to interpolate; IDC is starting to collect it. Meanwhile, there are arguments as to the effect System/32 will have on the Burroughs base. It probably won't be too severe. Both Burroughs and IBM attempt to present the small user with a total solution -- not hardware. So satisfied Burroughs users are not likely to try another vendor.

Honeywell Information Systems, among other things, got caught last year in the double vise that a new product cycle combined with recession can bring. With a concept designed to take care of all its existing customers, HIS about this time last year introduced a full range of computers -- based on GE products at top and bottom of the line -- and the successful GECOS operating system. The on-order situation seems pretty good.

Developments so far in 1975, however, seem to indicate a change of emphasis as to computers within Honeywell. The management selection/change of headquarters location of late last year stripped autonomy from the operation; rumors flourished about Honeywell's selling out to the French, getting out of the peripherals business, even selling off its installed base in the U.S.

So far, HIS has announced its 30/70 peripheral venture with CDC . . . seems sure to lose its grip on Honeywell Bull . . . but apparently is betting on livening up its computer business by "liberating" IBM System/3 users (page 20). All in all, there are questions . . . as well as grounds for hope -- new products and new users as recovery from recession begins. But a gradual decommitment -- combined with an increased emphasis on controls and communications, with emphasis on minicomputers -- would not be a surprising development.

Sperry Univac for several years seems to have spawned rumors that it is going to announce -- soon -- a small business computer. But so far, the company has opted to go after the medium- and large-scale computer customer -- its own as well as those picked up from RCA -- with a successful offering of equipment. The recent merger of Remington Rand into the Univac division could change this, however, bringing even more pressure to enter the market IBM's System/32 has opened for many people.

At present, Univac seems to be on a successful medium-scale tack based on the 90/30 announced last summer. Deliveries only started a couple of months ago, but feedback is that this product -- almost a computer family with its rental (and corresponding capability) ranging broadly from $4,000 to $17,000 a month -- is being successfully received.

And -- being very careful to protect the mainstay, large and very large 1100 end of its product line, keeping it up to snuff during the time period in which IBM is expected by most observers to announce and even begin deliveries of new large-scale offerings -- Univac recently perked up its product line by adding semiconductor memory (thereby reducing memory prices) and allowing more multi-processing with the new 1100/20 (a product in the 1106 II price range) and 1100/40 (priced, if fully configured, about as high as a user would want to go). Also included are significant software packages.

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Control Data and NCR have a joint development effort for a future series of processors -- and seem to be quite successful with their joint effort in peripherals, which ICL has also joined. It will likely be just a matter of time before the CDC/Honeywell peripheral effort will be merged with CPI. But insofar as general purpose computers are concerned, each of the companies seems to be following a plan under which CPUs per se are primarily support products.

Control Data says loud and clear that it is out to become a services company -- using its network and equipment as the factory. Along the way it is also producing good revenues from sales of peripherals on its own, and seems to be having reasonable success toting up orders for its new Cyber 170 series machines.

NCR, for its part, is illustrating how to become the leading autotransaction supplier. Hardware revenues from banking and retail terminal and data entry systems almost doubled last year from just over $150 million in 1973 to $296 million in 1974. Add in some revenues from supporting services, and you have the autotransaction giant. And the other major area of activity coming down the pike would seem to be the small business user market (and protection of installed base). Once again, computers continue to be necessary products to support (and capture) other business. Having a line developed jointly with CDC could only help to enhance a reliability/dependability reputation for backup equipment.

These "other" mainframers accounted for 25% of general-purpose computer shipments in 1974 and -- because many of their product cycles are still swinging up as IBM's shifts downward -- their shipments could account for nearly 30% of the total during 1975. Most shipment levels in the charts (pages 9-11) will appear slightly larger than would be expected; forecasts for 1975 and beyond are expressed in 1975 "if-sold" dollars (calculated at prices -- most of them higher -- posted for 1975).

MINICOMPUTER SHIPMENTS SLOW TO A GALLOP AS INDUSTRY MELLOWS; NEW PRODUCTS STRETCH DEFINITIONS; 1975 REVENUES TO NUDGE $1.5 BILLION

Once it was easy. EDP/IR called them dedicated application computers -- they were mainly minis -- and market forecasts were relatively straightforward because they were in a class by themselves. But now they can come in forms varying from single-board components to software-shrouded general-purpose systems . . . they don't always have to be purchased outright anymore, rentals and leases are available . . . and manufacturers have even benchmarked performance of some against IBM 370/158s.

Sometimes it seems that the only way to tell if a computer is a mini or not is to see who makes it.

What it boils down to is a question of definitions -- price, dataword size, use -- and some new ones are probably needed. But until they are worked out, EDP/IR and publisher International Data Corporation will look at this volatile business as we have in the past: The production and marketing of the computers normally listed in the semiannual Group B Census (and some new products announced by the minimakers). Shipment and installed base history and forecasts are presented on page 11; a market share breakdown -- by number and value of shipments for U.S. manufacturers -- appears on the next page. It should be noted that, for all companies except IBM, revenues are used as dollar shipment values.

But the numbers aren't everything -- not by a long shot. EDP/IR observes several trends -- some working seemingly at cross purposes -- behind the digits; most will have an effect on the industry's future:

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- *Use in networks:* More and more minicomputers are finding niches in commercial data processing environments -- yet away from the computer room. Hewlett Packard's HP 3000, General Automation's DM 200, and Data General's C 300 Eclipse are examples of minis particularly well-suited for such distributed use.

- *Compatible families, modular system building:* Consistent with the increased amount of software value being added to minis these days, the manufacturers are stressing product line compatibility and modularity . . . which may hinder the ability for a maker to swing with the technological currents but pays off in customer base grooming.

- *Shifting applications:* By far, the most common use of minis has been in the factory or the lab for process control, automation, instrumentation, and engineering . . . but as microcomputers invade the low end of these domains, more and more minis should find themselves landing in autotransaction, commercial DP, and communications systems.

- *Low-end encroachment:* Microprocessors and computers are here to stay, and the smaller minis (e.g. Computer Automation's Naked Mini) may find themselves undercut by the Intel, Rockwell, National Semiconductor, and other chips. The big minis, however -- in addition to all types of terminal equipment and other peripherals -- will emerge as an end market for these same micros. EDP/IR estimates that only 15% of the mini market will be exposed to the micro threat during the next several years.

- *High-end expansion:* Continuing cost declines and technological improvements have made big-scale minis viable, and IBM has at last provided a yardstick -- in the commercial DP market at least. DEC, Data General, and Hewlett Packard -- all of whom have substantial end user

DEDICATED APPLICATION COMPUTER MARKETPLACE -- 1974 ACTIVITY
(Estimates of Units Shipped and $ Million Revenues; Copyright 1975 by IDC)

Company	Units	% Total	$M Revenues	% Total
Digital Equipment	14,000	29%	$ 410	35%
Hewlett Packard	4,000	8	150	13
IBM (*value of shipments)	2,500	5	145*	12
Data General	5,900	12	92	8
General Automation	2,600	5	65	6
Honeywell	725	2%	$ 50	4
Varian	1,200	3	34	3
Interdata	975	2	30	3
ModComp	900	2	26	2
Computer Automation	4,200	9	22	2
Systems Engineering Labs	180	-	$ 18	2
Microdata	2,300	5	15	1
Digital Computer Controls	2,500	5	10	1
Others	6,020	13	103	8
TOTALS	48,000	100%	$1,170	100%

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business -- may resent the new System/32-think, but at least they have the advantage of a new price and performance benchmark.

- *OEM to end-user balance:* Approximately 65% of the units going out are to original equipment manufacturers, but only 45% of the dollar value. Mini makers are constantly searching for the proper mix, balancing volume sales at OEM discounts (and subject to big cancellations) against development and support "handholding" costs. During economic slowdowns, it appears, OEM business remains the more firm.

Having crossed the great $1 billion divide in 1974, the minicomputer industry seems finally to be coming of age. In 1976, business will rebound to above 30% revenue growth following a "depressed" (25% growth) year in 1975. Then, growth will slow to a healthy (20%-to-25%) but unhectic pace for the final years of the 1970s. Manufacturers will be forced to rely more and more on sophisticated marketing and smart product development to sell their wares. Sheer energy and innovation are no longer enough . . . users are wising up.

Another telltale sign of this ripening is the burgeoning quantity of software that the mini houses are issuing these days: potent operating systems, high-level programming languages, compilers, optimizers, and even data base management systems. As hardware costs drop, "value added" gets more cerebral.

Chips more promise than threat

MICROPROCESSORS GO MAINLY FOR NEW APPLICATIONS OR FOR MINICOMPUTER SUPPORT

As the flashy micros grab trade journal headlines and chips grow in complexity (the phrase "Grand Scale Integration" [GSI] has already been coined) one question keeps popping up. How will the minicomputer industry -- or all of computerland for that matter -- be affected by the onslaught? The chips are certain to cause a revolution in the electronics industry, but does that mean disruption to the computer industry . . . or will there be a bloodless coup?

Studies by International Data Corporation -- which began detailed investigation of the semiconductor industry last year -- indicate there will be an eighty-fold increase in microprocessor unit shipments from 1974 (when shipments hit the 100,000 level) to 1980. In dollar terms, this will mean a growth from the $110 million level (for CPUs and memory) this year to about $700 million by 1980. And by that time, microprocessor chips and systems will add up to about one-fourth of all integrated circuit shipments from U.S. factories.

But even as all these microprocessors gush forth and cause attendant upheavals in the semiconductor industry, certain factors will ameliorate the actual impact their presence has on the computer industry:

+ Unit costs for microcomputer sets will decline by a factor of six in less than four years. This means the price will go from current levels of about $600 per set (including memory and I/O) to the $80-to-$120 range in 1977. This dramatic drop in cost implies (and actually will result from) that micro makers will need to find and plumb new mass markets. Even if all the minicomputers forecast to be shipped in 1978 were replaced by micros, it wouldn't be nearly enough business to support an industry. So thrust into the computer area won't even be at the top of the micro makers' lists.

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+ Microprocessor makers are not considered capable of supplying systems with the equivalent in software, support, and price/performance that building-block minis offer today. By 1976 and later, however, some OEMs may choose to replace outside minis for in-house or custom-built micro systems, but penetration is estimated at 15% of the market (by number) at most. Other microprocessor drawbacks are: lack of speed, versatile instruction sets, I/O capacity, and fast data transfer; cost of the subsystem external to the microprocessor unit.

+ Sole source availability and shakey lead-times for microprocessor CPU components are design inhibitors at the component level. Normal "make or buy" decisions about component procurement will be heavily influenced by minicomputer prices during 1976 and 1977.

Thus, for reasons such as those indicated above, microprocessors have a better chance of ending up as components in minicomputers than as replacements. In this role, penetration is expected to be about 15% to 20% in 1977, increasing to 45% or even 50% by 1980. Even then -- with shipments of minicomputers well over the 100,000 mark in the United States alone -- this will be a small market for microprocessors. In other words, the chipmakers will have to explore new applications if they want to bring home the bacon . . . and the minicomputer industry -- plus the peripherals and terminal portion of the general-purpose industry -- is much more likely to be enhanced than threatened by microprocessors.

ACTION IN THE LEGAL THICKET -- AT A SNAIL'S PACE?

Much of the industry news this year radiated out from courtrooms and legal chambers as IBM contended with its tangle of antitrust lawsuits . . . and as 1975 begins to shape up, it looks as though the record-setting number of cases against that company may well be a good example of the hares chasing the hound.

It's quite possible that legal developments ahead could have a much more profound and lasting effect on the shape of the industry -- meaning for the most part IBM -- than any other single factor . . . and with the Justice Department case about to start and the prospect of the U.S. Supreme Court looking (or deciding not to look) at the issues in the Telex case, 1975 may be the year to watch. A Review and Forecast recap:

Telex vs. IBM

This was the big one. On late Friday, January 28, 1975, almost a year after IBM filed its appeal in the case, the three Judges -- Seth, McWilliams, and Doyle -- sitting for the U.S. Court of Appeals, Tenth Circuit, reversed their Tulsa compatriot, Judge A. Sherman Christensen, and found IBM not guilty of monopolistic practices. Adding to the plaintiff's chagrin, Telex was found still answerable to theft of trade secrets -- to the tune of $17.5 million compensatory damages and $1 million punative damages. That works out to more than a sixth of the company's annual revenue.

It was a potent, percussive decision, and trading in Telex and IBM stock was immediately halted on the New York exchange. When it resumed, IBM's shot up and spurred a rally on Wall Street . . . and Telex' skidded downward, causing shudders throughout the PCM world. One company at least, Transamerica, quickly wrote $13 million off the value of Telex gear in its leasing portfolio in an attempt to cut future losses due to the equipment's dwindling viability.

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WORLDWIDE COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1969	19,100	87,000	$ 6,805	$ 29.3
1970	23,100	105,800	6,715	34.2
1971	27,800	129,200	7,077	38.5
1972	40,900	160,300	8,535	42.5
1973	54,130	204,800	9,575	47.9
1974	62,320	255,840	$ 11,235	$ 54.1
1975	77,400	324,500	$ 11,170	$ 60.8
1976	112,800	426,300	12,240	68.3
1977	144,500	558,800	14,900	76.8
1978	169,500	713,300	17,700	87.5
1979	185,900	885,900	18,920	99.7
		UNITED STATES		
1969	12,700	56,800	$ 4,430	$ 20.3
1970	14,600	68,300	3,920	23.0
1971	17,600	83,200	4,177	25.1
1972	27,400	104,000	5,395	26.8
1973	38,700	133,250	5,945	29.9
1974	42,900	165,040	$ 7,030	$ 33.6
1975	53,300	209,800	$ 6,900	$ 37.6
1976	78,000	277,000	7,500	42.0
1977	98,800	361,300	9,100	46.9
1978	114,900	458,200	10,720	53.2
1979	128,000	566,200	11,240	60.2
		INTERNATIONAL		
1969	6,400	30,200	$ 2,375	$ 9.0
1970	8,500	37,500	2,795	11.2
1971	10,200	46,000	2,900	13.4
1972	13,500	56,300	3,140	15.7
1973	15,430	71,550	3,630	18.0
1974	19,420	90,800	$ 4,205	$ 20.5
1975	24,100	114,700	$ 4,270	$ 23.2
1976	34,800	149,300	4,740	26.3
1977	45,700	197,500	5,800	29.9
1978	54,600	255,100	6,980	34.3
1979	57,600	319,700	7,680	39.5

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GENERAL-PURPOSE COMPUTER MARKET (GROUP A)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1969	11,000	66,700	$ 6,450	$ 27.8
1970	12,000	74,800	6,300	32.4
1971	14,300	85,200	6,700	36.3
1972	18,300	94,800	8,000	39.8
1973	20,230	106,800	8,800	44.5
1974	14,320	111,840	$ 10,065	$ 49.5
1975	17,400	122,500	$ 9,700	$ 54.8
1976	27,800	141,300	10,300	60.4
1977	34,500	165,800	12,500	66.6
1978	34,500	187,300	14,800	74.6
1979	30,600	206,900	15,500	83.4
		UNITED STATES		
1969	6,000	40,700	$ 4,150	$ 19.1
1970	5,700	43,800	3,600	21.5
1971	7,600	49,200	3,900	23.3
1972	10,700	54,000	5,000	24.7
1973	14,000	62,250	5,400	27.3
1974	8,900	65,040	$ 6,220	$ 30.2
1975	11,600	72,800	$ 5,900	$ 33.2
1976	18,500	87,000	6,200	36.3
1977	21,800	102,800	7,500	39.7
1978	20,900	116,200	8,800	44.1
1979	18,000	128,200	9,000	48.8
		INTERNATIONAL		
1969	5,000	26,000	$ 2,300	$ 8.7
1970	6,300	31,000	2,700	10.9
1971	6,700	36,000	2,800	13.0
1972	7,600	40,800	3,000	15.1
1973	6,230	44,550	3,400	17.2
1974	5,420	46,800	$ 3,845	$ 19.3
1975	5,800	49,700	$ 3,800	$ 21.6
1976	9,300	54,300	4,100	24.1
1977	12,700	63,000	5,000	26.9
1978	13,600	71,100	6,000	30.5
1979	12,600	78,700	6,500	34.6

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DEDICATED-APPLICATION COMPUTER MARKET (GROUP B)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1969	8,100	20,300	$ 355	$ 1.4
1970	11,100	31,000	415	1.8
1971	13,500	44,000	377	2.2
1972	22,600	65,500	500	2.7
1973	33,900	98,000	770	3.4
1974	48,000	144,000	$ 1,170	$ 4.6
1975	60,000	202,000	$ 1,470	$ 6.0
1976	85,000	285,000	1,940	7.9
1977	110,000	393,000	2,400	10.2
1978	135,000	526,000	2,900	12.9
1979	155,000	679,000	3,420	16.3
		UNITED STATES		
1969	6,700	16,100	$ 280	$ 1.2
1970	8,900	24,500	320	1.5
1971	10,000	34,000	277	1.8
1972	16,700	50,000	360	2.1
1973	24,700	71,000	540	2.6
1974	34,000	100,000	$ 810	$ 3.4
1975	41,700	137,000	$ 1,000	$ 4.4
1976	59,500	190,000	1,300	5.7
1977	77,000	258,500	1,600	7.2
1978	94,000	342,000	1,920	9.1
1979	110,000	438,000	2,240	11.4
		INTERNATIONAL		
1969	1,400	4,200	$ 75	$ 0.3
1970	2,200	6,500	95	0.4
1971	3,500	10,000	100	0.5
1972	5,900	15,500	140	0.6
1973	9,200	27,000	230	0.8
1974	14,000	44,000	$ 360	$ 1.2
1975	18,300	65,000	$ 470	$ 1.6
1976	25,500	95,000	640	2.3
1977	33,000	134,500	800	3.0
1978	41,000	184,000	980	3.8
1979	45,000	241,000	1,180	4.9

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Most recently, Telex had its petition for re-hearing in front of the full appellate court rebuffed . . . and readied itself to ask for a hearing before the U.S. Supreme Court. EDP/IR's antitrust lawyer-consulant in the matter gave the High Court 50-50 odds of accepting the case . . . and almost none of actually hearing it. The reasoning behind the latter prediction is the supposition that if the court agrees to review the Telex petition, then IBM will settle out of court with the PCM . . . to avoid another reversal. This would allow the Tenth Circuit decision to survive in the history books.

Although the decision in the Telex case is binding only in the Tenth Circuit, the legal reasoning on questions of market share and predatory conduct could be applied in the other cases (indeed, some of the "West Coast" litigants have already amended their complaints to account for a broader market definition) . . . and at any rate is a significant bolster to IBM's defense.

U.S. vs. IBM

While the Telex case scooped most of the headlines, the Justice Department case rumbled slowly toward a conclusion . . . of a beginning. Over objections of both parties, the presiding judge put his foot down and called for a May 19, 1975, trial opening -- six years, four months, and two days after the case was first begun -- and indicated that his patience was wearing thin with the delays.

And most of the Judge's displeasure was directed toward the government . . . to whom time and inertia appear to be foes at least as formidable as giant IBM. Witness the following exchange which took place at a pretrial hearing on March 4 between Judge Edelstein and the Government's Counsel:

The Court: You have been getting further and further behind in the preparation of this case. Very few deadlines have been met. Now, if this was due to inadequacy of staff or other reasons, why haven't you undertaken to correct them? And if you couldn't correct them because of your bureaucratic problems, why didn't you ask me to help you?

Counsel: I think bureaucratic problems certainly are a factor, your Honor. However, I think a very large factor is the kind of proceeding that we have been involved in here; that is, a far flung discovery proceeding that has never stopped.

The Court: You keep harping on that. It is getting nauseating. Your adversary has had to cope with the same problems, has it not? They have had to meet all of these problems. IBM has provided the manpower necessary to defend. Why hasn't the Department of Justice done the same?

The DOJ case per se attempts to show that IBM is a monopoly by virtue of its marketplace oomph (de facto standards, "price umbrella," entry-capital hindrance) . . . and the company's clear use of that monopoly power (bundling, fighting machines, educational allowances, below-cost peripherals). In its old issues, at least, the DOJ case is primarily the same as the CDC case. So it could be argued that preparation slow and ragged enough to fluster the judge will still have substance at least as solid or better than CDC's. Remember that IBM chose to pay $100 million, give up a $63 million company (SBC), and work out R&D contracts in order to settle with CDC out of court.

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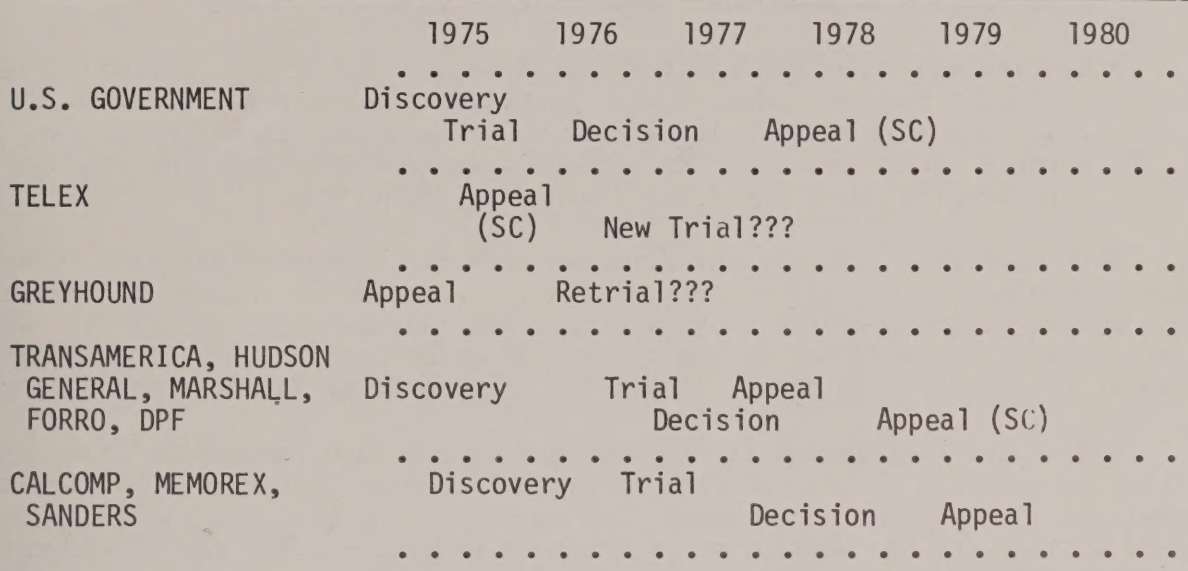
IBM ANTITRUST TIMETABLE*



*Spacing, to indicate timing, is approximate at best. Legal timetables are subject to stretchout. Two events could have significant impact on the cases mentioned above: (1) Hearing of Telex by Supreme Court, and a strong opinion (unlikely) and (2) consent decree between IBM and U.S.

Now, if all goes according to Edelstein's plan, the DOJ trial will start next month with a recess scheduled a month after that to give the lawyers time to complete discovery on issues in the DOJ's amended complaint (the peripheral and third party leasing questions akin to those in the Telex case which arose after the DOJ complaint was filed). The probabilities of a consent decree after May 19 are slim since IBM would automatically be considered an antitrust violator in any settlement thereafter . . . and thus a candidate for private treble damage suits.

A consent decree before then -- which seems more and more unlikely -- would probably mean restructuring the company and, under the Tunney Bill enacted this January, filing of a "competitive impact" statement by the government. Since the statement would spotlight the defendent's monopolistic transgressions, the remedies provided for by the decree, and the avenues of redress for injured third parties . . . IBM might also be reluctant to a pretrial pact.

So the actual beginning of a trial -- half-baked and untidy as it seems it will be -- could well be the most significant event of the computeryear. And when the dust settles after opening, the industry might find IBM -- emboldened by the Telex reversal and not so touchy about antitrust considerations anymore -- more lethal than ever. Meanwhile, the final outcome of the match could be as far away as the computer generation after next . . .

Other forces vs. IBM

Quite a bit other lesser -- though substantial -- litigation is pending, and much of it is called the West Coast Cases. Actually, they are in two camps:

- Telex "tagalong" cases from Transamerica, Hudson General, and other third-party lessors of Telex equipment who claim to have suffered from

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IBM's monopoly. With the Telex case now a questionable precedent, the legal strategy of these litigants now may hinge on their demonstrating a difference between their cases and Telex's.

- Memorex and other cases not directly related to Telex. All of these litigants have the advantage of hindsight perspective insofar as Telex . . . and most have fatter corporate wallets (and therefore higher-powered legal forces). But without precedent from Telex or the Justice Dept.'s case, these may reach into the 1980s.

With no public fanfare, the European Economic Community has been investigating possible anticompetitive acts of IBM . . . and since complaints need not be made public under EEC rules until hearings are called, little should be heard for many months. Jurisdiction is limited to EEC countries and doesn't necessarily connect to goings-on in the U.S.; but EEC is sure to be watching the U.S. scene.

And on the legislative front, hearings on the data processing industry in relation to the Hart Industrial Reorganization Act were held before the Senate's Subcommittee on Antitrust and Monopoly last summer. The bill, as currently drafted, would provide for the assumption of monopoly power under any one of several standard criteria . . . and at least one of these might reasonably be applied to IBM. Chances for passage are slim, at present, since in one fell swoop the bill goes after the automotive, metals, communications, and drug industries in addition to the one IBM is so concerned with. Eventually, however, the answer may well stem from legislative rather than judicial definition.

The case for the defense

IBM has rejoinders for all allegations against it, naturally, and at the root of them lie the questions of relevant market and competitive versus predatory practices. So herein lies the importance of the Telex case . . . it was first decided, then overturned on the basis of those two issues.

It's easy -- and sometimes fun -- to bait a Giant. EDP/IR recognizes, however, that IBM's arguments in its own behalf have a certain fundamental cogency: If the industry is so monopolized, why has IBM been forced to react to competition? How can a company's products form their own complete and closed marketplace? Do only the makers of computer mainframes serve the data processing marketplace -- or are service bureaus, third-party lessors, minicomputer makers also involved? And where is the industry stagnation associated with monopoly?

IBM argues that it's simply survival of the fittest in a game of the highest corporate stakes . . . but others look around, scrutinize the past, and wonder if maybe the deck wasn't stacked. The courts must decide.

Competition from more corners

COMPUTING ADJUNCTS -- SERVICES AND AUTOTRANSACTION -- BECOME ALTERNATIVES

At the recent Adapso Management Conference, the unannounced but recurring theme was that lines of demarcation are disappearing. Increasingly, service bureaus compete with small business computers . . . turnkey systems replace special software packages . . . information appliances do double duty, including data entry. Indeed, the thrust behind strategies from both CDC and NCR (page 5) stems from an appreciation of the business potential inherent in this trend.

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As a result, two major sub-industries of greater than average growth exist within the framework of data processing. Both of these areas -- computer services and autotransaction -- are scheduled for major treatment by EDP/IR during coming months. Both are of growing importance to an understanding of the forces at work in the computer industry.

For several years, now, EDP/IR has analyzed computer services via a 3x3 matrix in which the columns represent type of use (raw power, transaction processing, data base inquiry) and the rows categorize access method (batch, remote batch, or interactive). These can be further simplified, and have the following outlook:

	1974	1979	Growth Factor
Batch processing (all)	$ 1580 M	$ 2425 M	1.5
Remote batch/timesharing	580	1760	3.0
Remote transaction	300	1535	5.1
Remote data base	225	905	4.0
TOTAL	$ 2685 M	$ 6625 M	2.5

The computer services industry today is not very concentrated. The top five companies -- Control Data, Automatic Data Processing, Electronic Data Systems, General Electric, and Bunker Ramo -- account for 20% of revenues. Consolidation is an ongoing activity, however, and by the end of this decade several companies could easily be chalking up $300 million to $500 million of revenues each, with the top 10 companies accounting for half the $6+ billion revenues forecast.

Autotransaction was defined two years ago by IDC to include specialized computer products and services that involve transactions to and from a data base. In general, these products or services have turned out to be those that result in the public's first interface with computers: point-of-sale terminals, automated tellers, reservations services, hotel accounting systems. Another characteristic of autotransaction is that it demonstrates the hardware/software/service competition that exists in many areas.

Unfortunately, even before performance characteristics can be established, regulation of various sorts is being proposed. If it all went through, the projections shown below probably wouldn't be met. EDP/IR sincerely hopes this does not happen. The real benefits of the computer -- as well as potential areas of misapplication -- show up vividly through autotransaction. Safeguards must be established . . . but progress shouldn't be impaired in the process.

AUTOTRANSACTION INDUSTRY -- WORLDWIDE REVENUES OF U.S. SUPPLIERS
(Estimates in $ Millions; Copyright 1975 by International Data Corporation

	1972	1973	1974	1975	...	1979
Batch Transaction (portion)	$ 285	$ 360	$ 440	$ 520		$ 900
Other Autotransaction Services	270	410	565	755		2500
Information Appliances	150	340	540	850		4700
Turnkey Systems	40	80	160	195		1585
Software and Other Products	105	145	200	260		955
TOTAL	$ 850	$1335	$1905	$2580	..	$10640

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General Purpose Digital Computer (Group A) Census, shown below, are based on the best information available to the International Data Corporation -- but they definitely are estimates. Computer manufacturers, as a rule, do not directly supply this type of information. It is only through the use of IDC's extensive data files and other information sources that estimates such as those in this Census are possible. The computers included in Group A comprise the bulk of digital computers (by value) in operation. These machines are byte or character oriented -- with the exception of large-scale scientific computers that have large words -- and are primarily programmed with higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and specialized-purpose machines.

AS OF JANUARY 1, 1975

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	B-200 Series	$ 5,600	11/61	75	60	135	X
	B-300 Series	$ 5,200	7/65	325	70	395	X
	B-500	$ 6,350	11/68	448	435	883	X
	B-70X/71X	$ 1,300	3/73	220	123	343	200
	B-72X	$ 2,000	4/75	–	–	–	NA
	B-1712	$ 2,100	8/72	220	110	330	150
	B-1714	$ 2,250	8/72	335	188	523	200
	B-1718	$ 3,500	11/74	NA	NA	NA	NA
	B-1726	$ 5,900	2/73	175	53	228	100
	B-1728	$ 8,300	8/73	75	34	109	90
	B-2500	$ 8,900	2/67	185	111	296	X
	B-2700	$ 8,700	8/72	165	100	265	100
	B-3500	$ 16,000	5/67	585	325	910	X
	B-3700	$ 22,600	11/72	85	38	123	70
	B-45/4700	$ 27,300	10/71	170	119	289	75
	B-4790	$ 41,000	11/75	–	–	–	25
	B-5500	$ 35,000	3/63	82	29	111	X
	B-5700	$ 29,500	12/70	22	7	29	X
	B-65/6700	$ 57,500	11/69	85	68	153	25
	B-7700	$120,000	8/73	5	2	7	4
	B-7750	$135,000	9/75	–	–	–	1
	Subtotals			3,257	1,872	5,129	1,040
Control Data Corp.	G-20	$ 19,600	4/61	3	5	8	X
	1604/A/B	$ 42,000	1/60	17	4	21	X
	31/3150	$ 9,100	12/64	83	47	130	X
	3170	$ 19,200	12/70	13	15	28	X
	3200	$ 14,700	5/64	47	44	91	X
	3300	$ 29,900	9/65	110	85	195	X
	3400	$ 23,700	11/64	4	8	12	X
	3500	$ 26,000	1/69	10	17	27	X
	3600	$ 49,000	6/63	13	10	23	X
	3800	$ 53,000	12/65	19	3	22	X
	6200	$ 39,000	11/70	2	6	8	X
	Cyber-72	$ 36,300	10/71	27	39	66	9
	Cyber-172	$ 41,200	6/75	–	–	–	10
	6400	$ 54,000	5/66	60	50	110	X
	Cyber-73	$ 51,700	3/72	17	38	55	11
	Cyber-173	$ 54,600	6/75	–	–	–	10
	6500	$ 74,800	12/67	20	15	35	X
	6600	$119,600	8/64	59	30	89	X
	Cyber-74	$115,500	3/72	5	7	12	2
	Cyber-174	$ 67,500	6/75	–	–	–	2
	Cyber-175	$ 84,000	6/75	–	–	–	2
	6700	$125,000	7/70	3	–	3	X
	7600	$171,600	1/69	14	6	20	X
	Cyber-76	$165,000	3/72	2	3	5	2
	Star-100	$250,000	12/73	1	–	1	2
	Subtotals			529	432	961	50
Digital Equip. Corp.	PDP-6	$ 10,000	10/64	16	8	24	X
	1040/1050	$ 13,300	10/67	181	72	253	20
	1055	$ 22,000	12/71	27	11	38	5
	1070/1077	$ 30,000	6/72	19	3	22	5
	Subtotals			243	94	337	30
HIS	Gamma-10	$ 2,550	7/64	–	975	975	X
	Gamma-30	$ 10,100	2/62	–	140	140	X
	G-5X Series	$ 1,650	1/66	670	3,100	3,770	X
	G-100 Series	$ 4,100	4/66	245	1,470	1,715	X
	G-200 Series	$ 14,000	4/61	170	50	220	X
	G-405/410	$ 9,200	2/68	15	8	23	X
	G-415/420	$ 14,300	5/64	117	182	299	X
	G-425/430	$ 17,350	6/64	33	98	131	X
	G-435/440	$ 22,400	9/65	90	48	138	X
	G-615	$ 56,100	6/69	4	22	26	X
	G-625	$ 66,300	4/65	2	3	5	X
	G-635	$ 81,600	5/65	42	18	60	X
	G-645	$122,400	7/66	2	1	3	X
	G-6025	$ 22,200	11/73	36	13	49	X
	G-6030/40	$ 37,000	6/71	90	116	206	X
	G-6050/60	$ 52,000	7/71	94	55	149	X
	G-6070/80	$ 68,900	7/71	40	14	54	X
	G-6180	$102,000	2/74	3	–	3	X
	G-Subtotals			1,653	6,313	7,966	–
	H-105	$ 2,575	11/71	575	135	710	X
	H-110	$ 2,650	9/68	90	130	220	X
	H-115	$ 5,450	3/70	800	380	1,180	X
	H-120	$ 4,700	1/66	310	140	450	X
	H-125	$ 8,400	12/67	63	260	323	X
	H-200	$ 6,500	3/64	400	200	600	X
	H-2020	$ 2,400	2/73	440	50	490	X
	H-2030	$ 5,150	1/73	85	14	99	X
	H-2040	$ 9,900	4/72	315	110	425	X
	H-1015	$ 12,750	4/71	105	58	163	X
	H-2050	$ 14,800	4/72	190	60	250	X
	H-12/1250	$ 12,700	2/66	275	143	418	X
	H-2015	$ 18,300	2/71	100	55	155	X
	H-2060	$ 21,000	4/72	95	20	115	X
	H-2200	$ 20,000	1/66	115	45	160	X
	H-2070	$ 25,300	5/72	65	11	76	X
	H-3200	$ 27,400	2/70	65	28	93	X
	H-4200	$ 31,600	9/68	25	5	30	X
	H-2088	$ 44,900	4/72	5	1	6	X
	H-8200	$ 74,500	2/69	22	4	26	X
	H-4/1400	$ 13,500	12/61	20	22	42	X
	H-800	$ 29,100	12/60	31	10	41	X
	H-1800	$ 46,900	7/64	7	4	11	X
	H-61/58	$ 1,950	1/75	–	–	–	450
	H-61/60	$ 3,300	1/75	–	–	–	
	H-62/40	$ 3,800	1/75	–	–	–	400
	H-62/60	$ 4,300	1/75	–	–	–	
	H-64/20	$ 7,400	1/75	–	–	–	280
	H-64/40	$ 12,700	1/75	–	–	–	
	H-66/10	$ 18,300	7/75	–	–	–	
	H-66/20	$ 23,300	1/75	–	–	–	
	H-66/40	$ 36,200	1/75	–	–	–	270
	H-66/60	$ 48,800	1/75	–	–	–	
	H-66/80	$ 90,000	1/75	–	–	–	
	H-68/60	$ 70,000	3/75	–	–	–	3
	H-68/80	$100,000	1/75	–	–	–	
	H-Subtotals			4,198	1,885	6,083	1,403
	HIS-Totals			5,851	8,198	14,049	1,403

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AS OF JANUARY 1, 1975

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
IBM	System/32	$ 900	3/75	-	-	-	5,000
	System 3/6	$ 1,750	12/70	3,100	1,925	5,025	-
	System 3/8	$ 1,900	6/75	-	-	-	150
	System 3/10	$ 2,550	1/70	16,825	7,900	24,725	1,850
	System 3/15	$ 4,650	3/74	1,200	400	1,600	1,800
	360/20	$ 3,675	12/65	2,400	3,960	6,360	X
	360/22	$ 5,900	7/71	575	230	805	X
	370/115	$ 7,450	4/74	850	570	1,420	1,050
	360/25	$ 7,650	10/68	435	825	1,260	X
	370/125	$ 11,250	6/73	1,750	980	2,730	950
	360/30	$ 11,400	6/65	2,685	2,150	4,835	X
	370/135	$ 17,500	5/72	2,750	1,540	4,290	650
	360/44	$ 14,500	7/66	53	75	128	X
	360/40	$ 20,400	6/65	1,275	1,505	2,780	X
	370/145	$ 31,700	7/71	1,925	980	2,905	195
	360/50	$ 32,700	8/65	585	490	1,075	X
	370/155	$ 60,300	2/71	695	450	1,145	X
	370/158	$ 67,500	5/73	635	215	850	325
	360/65	$ 70,700	11/65	430	205	635	X
	370/165	$102,000	6/71	150	70	220	X
	370/168	$126,700	7/73	151	40	191	100
	360/67	$114,200	6/66	33	12	45	X
	360/75	$ 95,900	1/66	32	15	47	X
	360/85	$143,800	10/69	5	4	9	X
	360/9X	$153,000	11/67	14	2	16	X
	370/195	$198,500	3/71	20	4	24	-
	1130	$ 2,350	2/66	2,470	1,800	4,270	X
	1401	$ 3,775	9/60	870	800	1,670	X
	1401-G	$ 2,350	5/64	70	28	98	X
	1401-H	$ 1,325	6/67	25	40	65	X
	1410	$ 17,350	11/61	83	50	133	X
	1440	$ 4,800	4/63	163	168	331	X
	1460	$ 10,000	10/63	50	37	87	X
	1620	$ 2,750	9/60	280	225	505	X
	7010	$ 26,500	10/63	13	7	20	X
	7030	$163,200	5/61	3	1	4	X
	704	$ 32,600	12/55	1	1	2	X
	7040	$ 25,500	6/63	9	15	24	X
	7044	$ 37,200	6/63	8	10	18	X
	705	$ 38,800	1/56	3	3	6	X
	7070-74	$ 27,500	3/60	97	35	132	X
	7080	$ 61,200	8/61	43	1	44	X
	7090/94	$ 71,900	8/60	58	10	68	X
	Subtotals			42,819	27,778	70,597	12,070
NCR	Century-50	$ 2,050	2/71	1,100	220	1,320	275
	Century-100	$ 2,980	9/68	830	950	1,780	X
	Century-101	$ 2,850	10/72	1,000	140	1,140	725
	Century-151	$ 3,500	2/75	3	-	3	100
	Century-200	$ 8,000	9/69	640	390	1,030	X
	Century-201	$ 10,000	8/74	35	3	38	130
	Century-251	$ 10,000	11/73	85	34	119	120
	Century-300	$ 22,600	2/72	40	24	64	10
	304	$ 10,000	1/60	5	-	5	X
	310	$ 1,000	5/61	13	10	23	X
	315	$ 5,000	5/62	310	358	668	X
	315-RMC	$ 11,800	9/65	54	44	98	X
	390	$ 800	5/61	230	142	372	X
	500	$ 1,150	10/65	700	1,410	2,110	X
	Subtotals			5,045	3,725	8,770	1,360
Philco	1000	$ 7,000	6/63	8	1	9	X
	210/211	$ 40,000	10/58	6	1	7	X
	212	$ 52,000	1/63	6	1	7	X
	Subtotals			20	3	23	X
Singer	System 10	$ 2,550	10/70	1,140	810	1,950	400
Standard Computer Corp.	IC-4000	$ 9,000	9/68	4	-	4	X
	IC-6000	$ 16,000	5/67	3	-	3	X
	IC-7000	$ 17,000	6/69	7	-	7	X
	Subtotals			14	-	14	X
Univac	I/II	$ 26,500	3/51	3	2	5	X
	III	$ 26,900	8/62	31	36	67	X
	SS-80/90	$ 8,500	8/58	13	17	30	X
	418-I/II	$ 14,500	6/63	70	63	133	X
	418-III	$ 20,800	7/69	44	55	99	X
	491/492	$ 28,600	12/61	16	12	28	X
	494	$ 44,300	2/66	52	45	97	X
	1004	$ 1,100	2/63	815	740	1,555	X
	1005	$ 1,730	4/66	600	200	800	X
	1050	$ 9,325	9/63	156	140	296	X
	1103/5	$ 37,100	12/50	-	3	3	X
	1106	$ 42,400	12/69	90	135	225	30
	1107	$ 60,400	10/62	6	13	19	X
	1108	$ 72,800	9/65	130	97	227	X
	1110	$ 90,100	6/72	30	42	72	20
	9200	$ 2,530	6/67	1,175	880	2,055	X
	9300	$ 4,300	9/67	875	870	1,745	X
	9400	$ 12,300	5/69	265	297	562	X
	9700	$ 22,900	8/72	10	17	27	X
	90/30	$ 8,700	2/75	-	-	-	350
	1100/20	$ 43,300	4/75	-	-	-	35
	1100/40	$113,300	7/75	-	-	-	25
	90/60	$ 17,200	1/74	85	27	112	150
	90/70	$ 23,300	11/73	42	12	54	80
	Subtotals			4,508	3,703	8,211	690
	301	$ 7,060	10/60	122	6	128	X
	501	$ 17,100	6/59	8	-	8	X
	3301	$ 24,100	7/64	54	-	54	4
	Spectra 70/15	$ 4,200	9/65	11	-	11	X
	Spectra 70/25	$ 7,400	9/65	2	2	4	X
	Spectra 70/35	$ 13,000	1/67	88	5	93	X
	Spectra 70/45	$ 24,000	11/65	242	18	260	X
	Spectra 70/46	$ 40,400	11/68	31	2	33	X
	Spectra 70/55	$ 38,400	11/68	7	2	9	X
	Spectra 70/60	$ 44,500	9/70	19	-	19	X
	Spectra 70/61	$ 50,000	3/71	10	-	10	X
	Spectra 1600	$ 3,800	1/69	65	-	65	X
	Spectra 70/2	$ 12,600	7/71	108	-	108	X
	Spectra 70/3	$ 20,400	10/71	19	-	19	X
	Spectra 70/6	$ 32,200	10/71	45	-	45	X
	Spectra 70/7	$ 39,900	10/71	22	-	22	X
	Subtotals			853	35	888	X
	Totals			5,361	3,738	9,099	690
Xerox	Sigma-5	$ 12,650	8/67	255	59	314	X
	Sigma-6	$ 20,000	11/70	40	8	48	X
	Sigma-7	$ 24,700	12/66	90	23	113	X
	Sigma-8	$ 19,000	9/71	25	9	34	X
	Sigma-9	$ 44,000	11/71	42	8	50	X
	530	$ 3,500	8/73	200	43	243	200
	550	$ 7,525	11/74	25	-	25	75
	560	$ 17,030	11/74	5	-	5	15
	940	$ 24,000	4/66	53	4	57	X
	9300	$ 8,500	11/64	22	4	26	X
	Subtotals			757	158	915	290
	TOTALS			65,036	46,808	111,844	17,333

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• FROM THE FOUNTAINHEAD: NEW ANNOUNCEMENTS BY IBM. The industry Giant -- some say monopoly -- was in the news in recent weeks with a spate of new products and other announcements that are bound to affect the whole industry . . . both short run and long.

First came two new high-end CPUs, one for the 370/158 and the other for the 370/168. The new models, scheduled for first customer shipments in September and June respectively, will come with a high-speed buffer fashioned out of 1K bipolar chips (a first for IBM buffers) double the capacity of old models. According to IBM, these buffers will increase internal CPU speed for most users from 5-12%; and conversion should cause few or no programming headaches. Other features include single-unit shutdown ability previously unavailable for the 158, and a new service processor for the 168 that tracks machine status and provides diagnostic printouts.

Not surprisingly, the new machines cost more than their predecessors: $118K, to be exact, for a new 158 CPU (same memory size) and $298.3K for the 168. Under rental (MAC), it costs $4000 more a month for the 158, $8950 for the 168. Field upgrades for user-owned older models will be available this fall -- at a cost equal to that price differential.

With the announcement, IBM placed the old 158 and 168 CPUs into its "Not In New Production" status and ceased their manufacture. A rundown on some other 370s:

Model:	115	125	135	145	158(old)	158(new)	168(old)	168(new)
Status:	NP	LNP	LNP	LNP	NINP	NP	NINP	NP
Entered:	--	11/74	3/74	11/73	....3/75....		....3/75....	

NP = New Production; LNP = Limited New Production; NINP = Not In New Production

Announced at the same time as the new 370 CPUs was OS/VS2 Release 3. From what IBM says, up to 7 computers can now share the same input, job, and output streams -- and a common pool of peripherals -- under the new release. Available now, the package is designed for use with 370/145s and up.

Second came four new members of the System/3 family -- extending the high end of that line into the price realm of the 370/115. The four new "C Models" of the System/3 Model 15 feature bigger main memories of 160K, 192K, 224K, and 256K bytes . . . and will rent from $3110 to $3710 a month ($125K - $150K purchased). IBM's General Systems Division is shooting for June delivery. Also part of the System/3 spruce-up is a new software package providing the Model 15 with remote job-entry support to a System/360 or 370 operating under HASP, OS/VS1, or OS/VS2 . . . and a feature allowing the S-3 Model 15 to be used with a 3741 Data Station instead of a card reader. The software features will be available in the fall.

The third and perhaps most spectacular new product in the IBM arsenal is an ultra fast laser-optic non-impact printer that can print up to 13,360 lines per minute (45K CPS!). Designated the IBM 3800, the "printing subsystem" operates on-line, has a forms overlay feature, and can print on 8½ x 11 plain paper. For use on IBM 370/145s and up, the printer won't be available commercially for over a year and will cost $310,000 with maintenance another $445 a month plus $2.30 per thousand feet of paper processed. A two-year ETP contract would have the printer costing $6250/month plus the $2.30 charge, simple rental would have it at $7344.

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The system is IBM's first non-impact printer and uses technology similar to that in its copiers. Considering the quantum jump in computer-output capability now available from IBM . . . and the VS connection, the 3800 may be more than just a product line anomaly. EDP/IR will look at the 3800 -- and its place on the IBM mandala -- in a future issue.

The fourth in the news agenda involved the proposed sale of 11 IBM computers (10 System/7s and a 370/158) to the Soviet Union . . . and supplied a little grist for at least one Presidential campaign mill. The computers were for use at Russia's Kama River truck plant east of Moscow, currently being built with the help of U.S. firms. In a fit of detente, the U.S. Department of Commerce okayed the deal and forwarded it NATO for approval. Meanwhile, Henry ("Scoop") Jackson (D-Wash.), who chairs the Senate Permanent Investigation Subcommittee, has called for study of the "precedent-setting export." As of now, the deal -- which includes only those eleven systems and not other high-technology items such as 3330 disk drives -- is in abeyance. IBM currently has only one other computer installed behind the iron curtain: an aging IBM 360/50 at the Ministry of Chemistry.

Fifth and most recently, IBM laconically announced it has "acquired an option to enter into a purchase agreement covering a substantial portion of the assets of Neotec Corporation, Silver Springs, Maryland." The option be must exercised by this June 16th and will cost IBM $5 million for the assets to be acquired. Included in the option are laser-scanning analytical instruments that measure grain, produce, and other products, and a moisture content analyzer. Neotec, incidentally, posted a net loss (unaudited figures) last year of $770,986 on revenues slightly over $3.7 million.

What's tantalizing is the question of "why?" Theories abound . . . and run up and down the scale of cynicism. Some see the IBM option as a logical outcrop of GSD's sensor-based work . . . others see it as a move by defendant IBM to broaden its revenue base on the eve of a trial that is very much concerned with its marketplace. For that matter, maybe it's just a move to out-psyche all the DOJ lawyers, competitors, and pundits that commonly seek to probe the Giant's unspoken mind.

And whether breathtaking or mundane, each bit of news that emanates from the big mainframer is one more still snapshot of a constantly moving entity . . . and, if for no other reason than the entity's size, the character and direction of that movement is important. Hence the "Gray Sheet's" emphasis. It's a fact of life.

• ANOTHER COUNTRY: MINICOMPUTER LAND. Typical of life in this upstart industry is the recent surfacing of Wang Labs, Inc., as a new contender in the end-user small business computer market with three new minis and a printer. A somewhat low-profile vendor of word processors and programmable calculators, Wang says it's shipped 20,000 "computer-based systems to first-time computer users" over the last five years . . . and feels that the service and support expertise picked up along the way gives it an edge in competing with that business-mini crowd, IBM included. The company is also betting on its products' price and ease of applications implementation. As usual, the company claimed to welcome IBM's limelighting of the marketplace with the System/32.

The three computers each come with main memory of up to 32KB and read-only memory of 24K or 42.5KB . . . and are hardwired for the BASIC language. The smallest is cassette-based, the next is diskette-based, and the largest is disk-based (10MB). Various peripherals are available, including the new 65 line-per-minute printer. Prices for the three minis

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in their minimum configurations are $5.7K, $10K, and $29K; the printer costs $5600. Software, which will come from a domestic network of 150 independent vendors, will be customized at user costs ranging from less than $1000 to $17K.

What's significant about the Wang announcement is not so much the new products it tosses into an already chock-a-block business-mini bin -- but the underlying trends it highlights: Service and support as the marketing key, applications software as a part of the end system, a homemade peripheral as new revenue source. Once again there is augury in day-to-day events.

• DEJA VU: HONEYWELL AND CDC. Following by three years the formation of a computer peripherals company by CDC and NCR, Honeywell and CDC have announced another. This time it's to engage "in the design, development, and manufacture of rotating mass memory products" -- meaning disks, drums, and two MICR reader/sorters on the side. Named Magnetic Memories, Inc., it will be 70% CDC's, 30% Honeywell's, and total assets will start about $75 million, employment 5000.

Many see the pooling of resources by these two companies -- both of which watched earnings drop during the last year -- as another sign that the only defense by non-IBMers against the Giant is a united one. For Honeywell especially, this joint venture represents a change from old routine . . . and a spokesman from that company said that there is no reason it couldn't happen again. The question is, how habit-forming are such unions . . . and do they lead to the ultimate joint venture, i.e., merger?

• OLD ROUTINE: HONEYWELL'S IBM "LIBERATOR." It's happening again. A dozen years ago Honeywell launched a fairly successful frontal attack against IBM by providing automatic translation aids for IBM 1401 users that switched to a Honeywell Model 200 in lieu of a more costly upgrade to an IBM 360. Now the company has announced plans to do the same to the IBM System/3. The ammunition Honeywell plans to use is a European-built Level 62 Model 62/40 computer, which will rent in the $2400 to $5400 range.

Also part of the "Liberator/3" program are 96-column card capability, RPG II software compatible with the System/3 RPG, and a direct-read file transfer capability for conversion from System/3 disks to Honeywell disks or diskettes. The Model 62/40 comes with 56K to 96K bytes of MOS memory, multiprogramming, a 140-instruction repertoire, and six I/O channels. It should be interesting to see if Honeywell can repeat history . . . and whether or not IBM users this day and age are so anxious to bolt.

• BETWEEN THE LINES: SYSTEM/32 ABROAD. IBM's World Trade Divisions have now begun introducing System/32 in major foreign countries -- without exactly perpetuating the industry-by-industry approach outlined for domestic 32s at the Atlanta announcement three months ago (EDP/IR Jan.20,1975). "The marketing approach is similar, but each country has its own procedures and is developing its own industry applications programs," says a corporate spokesman, who also stresses the autonomy of the World Trade operation.

Canada is most similar to the U.S., offering packages for construction, food and paper wholesaling, and office products. The U.K. has wholesale food and construction plus several general applications such as payroll, costing, general ledger. This approach is even more apparent in West Germany and Italy -- and Japan offers only its "cross industry applications." It appears that many of these IBM operations -- just like many potential U.S. competitors -- missed the GSD message.

Review and Forecast

EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" APRIL 19,1974 • VOL.9,NO.13 P.J.McGOVERN,PUBLISHER

Signs of synergism

INDUSTRY FUNDAMENTALS FINALLY LOOK GOOD AS COURTS CAST A CLOUD

For the first time in many a computeryear, major industry forces are not working at cross purposes. Indeed, for an industry shipping products at a $10-billion-a-year clip, the American-based computer business has a lot going:

- The teleprocessing growth phase entered last year continued strong throughout 1973 . . . undaunted by the Energy Crisis or talk of possible recession.

- Retirements as a percent of shipments dropped below the 50% level, and should stay in the 40%-to-50% range for the rest of this decade.

- As a result, U.S.-based mainframe manufacturers last year netted $4.7 billion on worldwide general-purpose shipments of $8.8 billion, bringing the installed base to $44.5 billion.

- The minicomputer market seems to be more insatiable each year; 1974 shipments of 50,000 units should be worth over $1 billion.

- Autotransaction hardware, or information appliances, accounted for $340 million in 1973; shipments are forecast to hit $1 billion by 1975, overtake the growing mini business a year or two later . . . while general-purpose shipments hover at the $9 billion level.

- Services of all types -- autotransaction and otherwise -- exceeded $2 billion in 1973 and should hit the $4 billion level in 1976.

Thus, the computer industry outlook is generally good . . . even great in sectors such as those singled out above. Yet a pall -- a transient lethargy at best -- pervades the industry's atmosphere. Some of it stems from Washington and Wall Street. A more serious portion, EDP/IR suspects, can be traced to various courts that hold IBM's -- and much of the computer industry's -- future in the balance.

Be that as it may, there are real signs that a new condition, synergism, is developing; independent activities in various portions of the computer industry are beginning to have more effect on the total industry than could be expected. The result is more pockets of safer business that is harder to measure.

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Looking back . . . and ahead

In preparing this Review and Forecast issue of EDP Industry Report, the editors have attempted to be particularly thoughtful. Ten years ago, the International Data Corporation published the first issue of this newsletter . . . a few weeks later, IBM announced System/360 and a distinct cycle of the computer industry began. Now, it seems to EDP/IR, the forces for another wave are building up within the still-young computer industry.

A rare glimpse into a major force center, IBM, was provided last year when many planning documents and reports of top-level management thinking were made public in the Telex/IBM trial. These 14,000 pages give only a partial picture of even IBM; but, when read in proper context they shed light on what happened and what might be expected. They also provide lots of data for examination.

Therefore, a fundamental part of IDC's computer industry snapshot this year involved the careful review -- and revision -- of EDP/IR's market data (pages 7 through 9) in light of the "Telex numbers" and other data. The historical portion of these basic figures will not casually be changed; IDC's projections, of course, will continue to be revised whenever there is better information.

Across the page, we've graphed the shipment, retirement, and "net add" numbers from page 7. They are worldwide, for U.S.-based manufacturers, and include both general-purpose (Group A) and dedicated application (Group B) computers (but not data entry equipment, nor the emerging field of information appliances -- see page 12). Basic assumptions are:

- Constant dollar base -- Because of technological innovation, inflation has never been a serious factor in measuring the computer industry. This may or may not continue, but all figures are in current dollars for the past, and in 1973/1974 dollars for forecasts.

- Technological innovation -- Three generations of electronic technology (discrete transistors, integrated circuits, and large scale integration) are represented in the installed base, with per-function costs continually declining. IDC believes this price elasticity will continue throughout the time period shown.

- Industry structure -- As mentioned earlier, a legal cloud -- and associated pleas for industry restructuring -- hangs ominously over the computer scene. But any change significant enough to alter macro-level forecasts cannot possibly be anticipated; thus, current industry structure (or a reasonable facsimile thereof) is assumed.

- Products -- Because of IBM's large share of market, shipment and retirement cycles are necessarily a function of IBM product introductions. These forecasts assume significant deliveries of FS (IBM's "future system," or successor to System/370) begin in 1977. Group A "Numbers" assume that computer systems will be counted more or less as they are today and that a sub-System/3 entry level system will be shipped in large numbers by 1976. Group B "Numbers" make no provision for specialized processors-on-a-chip that sell for a few hundred dollars or less. Even so, entries a few years out should be treated more like indications of a range. Also, many processors will be coupled, some in networks, in various degrees of "tightness."

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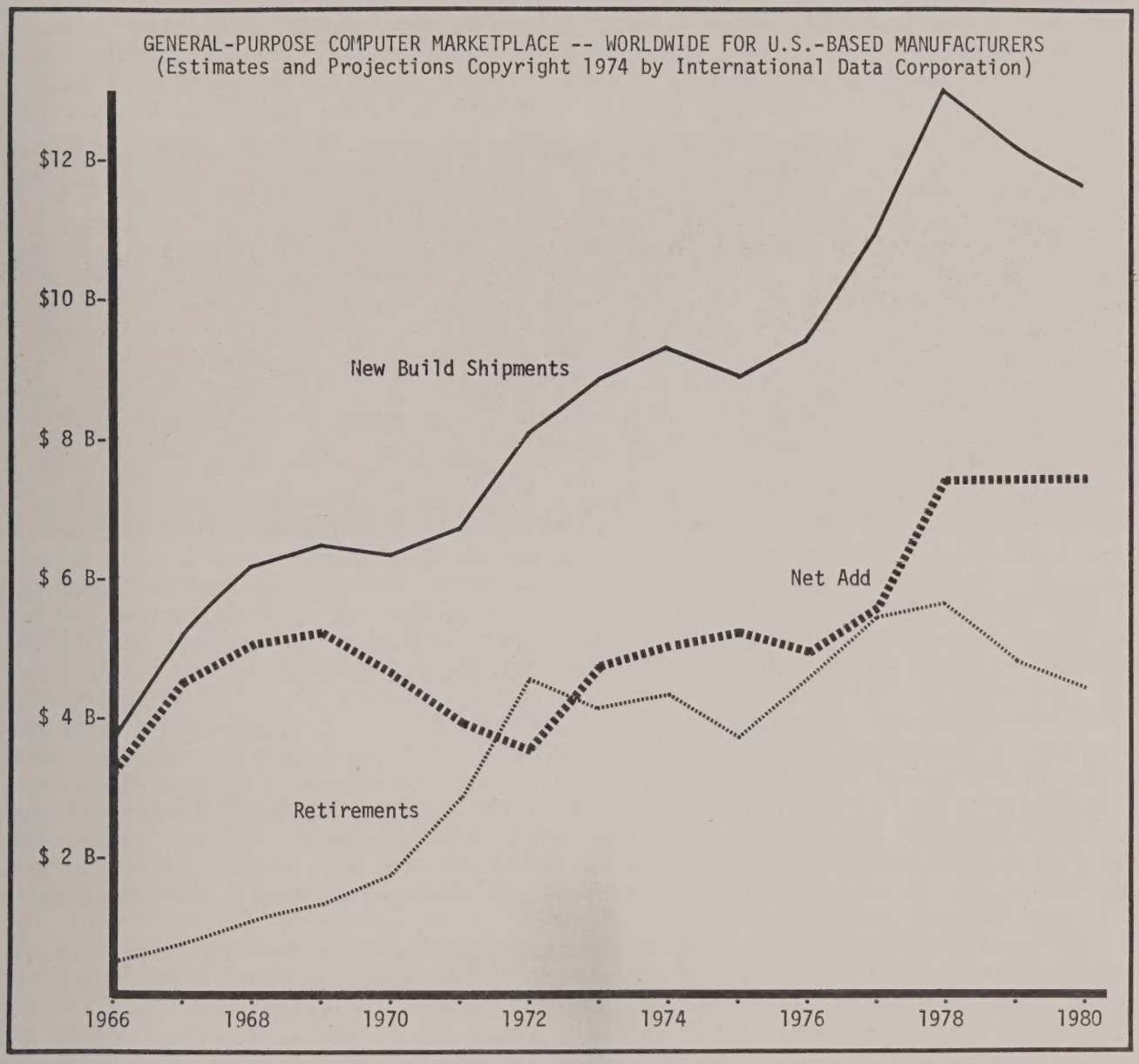

SYSTEMS, SOFTWARE, AND TELEPROCESSING KEY TO SUCCESS
AS GENERAL-PURPOSE SEGMENT ENTERS PERIOD OF STABILITY

The chart above indicates user demand as interpreted by IDC from several extensive surveys during the past two years. Incorporated into the numbers (page 8), as well, are IBM's internal assessments prepared about the time System/370 models were first being delivered. Shipments should increase 6% to the $9 billion level this year, then remain fairly flat until deliveries of IBM's FS begin. As retirements hold level or decline during the next couple of years, about $5 billion of each year's shipments should be added to the installed base.

In the U.S., only 43% of the computers (by value) are currently on rent (see page 6), down from 50% last year and 55% the year before. IDC surveys indicate that more and more users plan to purchase (or would like to arrange a third-party lease) and the extent to which this trend continues will determine the structure of the computer industry. One argument is this merely reflects better management and commitment to long-range plans on the part of users; IDC's extensive research

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supports this view. The other possibility to be considered, of course, is that subtle efforts on the part of IBM (and other mainframers?) are designed to foster this user attitude so that, for the late 1970s, a truly new generation of hardware can be shipped in vast quantities. In any event, the mainframe manufacturers control less equipment (as a percentage) than at any time in recent history.

The above situation -- in addition to the growing sophistication of computer networks and the commitment of users to incorporate key aspects of their business under computer management -- points to what is probably the strongest trend in computer acquisition considerations today. The operating system, or control software, is becoming more important to users than the actual hardware selected for use in a particular sized installation.

With the above points serving as a backdrop, here's a rundown on where the major mainframers stand as they enter a three-year period of relatively stable shipment levels and net addition to installed base:

IBM -- The big question about IBM, and for that matter about the entire EDP industry, is in the courts. The Telex verdict is being appealed (see page 16), and a decision should be forthcoming from Denver this summer; the Justice Dept. case is still set for trial in October. The Telex decision has had little if any effect in the marketplace to date, so rather than indulge in speculation, EDP/IR in this issue simply recognizes the monumental importance of whatever happens in the courts . . . and takes a look at the medium-term marketplace.

The forseeable business future looks bright for IBM. Production of 370 will probably peak during 1974, and a new entry-level machine below the System/3 likely will be announced. Probably of more significance this year or next will be the introduction of "Q" -- the new operating system (EDP/IR Jan.16,1974) that is supposed to meet "all" functional requirements for at least the next ten years. It will obviously be designed to smooth the movement from 370 to FS, and likely will offer users much more flexibility with teleprocessing/large data base networks.

Internationally, IBM is probably better equipped than the other mainframers -- than any other U.S. corporation, in fact -- to cope with fluctuating currencies, individual economic problems, the fuel crisis, inflation, and the like. It is so widespread, so established in major countries of the world, that one of the major challenges facing IBM is convincing nationalistic-minded governments that what's good for IBM is good for the individual country. There is growing pressure for at least the major World Trade companies to offer some local ownership.

HIS -- Honeywell has done an effective job in managing the merger of GE's computer interests in 1970. The 6000 series, for example, has proved to be more attractive to customers than even HIS management could have expected, and has accounted for considerable new business. But the rest of HIS's product line is old -- even the 2000 which is a price/improved version of the 200 series first introduced in 1963 -- and the company's prospects hinge on the new product line that was scheduled for introduction shortly after this issue went to press. A full report will be presented in the next issue, but early indications were that the new series would tie together many of the loose ends and clarify upgrade paths.

Univac -- In retrospect, Univac's 1972 acquisition of RCA's computer base has been much more successful than was expected. Loyalty from these users is measured by IDC as continuing at the 70%-to-80% level. And at the upper end of its product line, Univac's 1100 series -- especially the low-end 1106 -- if quite

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STATUS OF WORLDWIDE COMPUTER MARKET FOR U.S.-BASED MANUFACTURERS					
	1973 Shipments:		In Use Yearend 1973:		
	$M	% Total	$M	% Total	1972-73 Change
IBM	5,974	62.4	29,017	60.5	+ 11.4%
Plug-Compat.	574	6.0	1,620	3.4	+ 31.4%
HIS	831	8.7	5,010	10.5	+ 11.5%
Univac/RCA	554	5.8	3,618	7.5	+ 6.9%
Burroughs	456	4.8	2,244	4.7	+ 15.6%
DEC	272	2.8	964	2.0	+ 40.1%
NCR	270	2.8	1,205	2.5	+ 11.4%
CDC	243	2.5	1,996	4.2	+ 7.4%
Others (including minis)	401	4.2	2,254	4.7	+ 26.7%
TOTALS	9,575	100.0	47,928	100.0	+ 12.8%

successful in teleprocessing and data base operations. The small end of the 9000 series is entering obsolescense, and before this begins to hurt business, EDP/IR expects to see Univac introduce an entry level series to compete with System/3 as well as offer growth potential for 9200 and 9300 users. It might well be upward compatible with the successful 1100 series. Generally, Univac has broadened its industry stance via acquisition -- with Group B computers from EMR, disk file business from Data Products, peripherals from ISS, shared processors from Pertec.

Burroughs -- With perhaps the most complete full-line offering outside IBM, Burroughs has taken advantage of its established MCP operating system and continues to meet user needs for teleprocessing and data base operations. The 1700 is about the only computer making any inroads on the IBM installed base. Shipments of the 700 series are estimated to be about the midpoint of the generation cycle, so Burroughs seems to be in excellent position for the next year or two, at least. Its customers remain loyal, putting up with occasional startup problems because they like the results they eventually get from Burroughs offerings.

NCR -- Under new management and finally showing a profit in its computer operations, NCR is succeeding under a strategy that it used defensively: NCR needs computers . . . to support the business activity it excells at. It's new 299 electronic bookkeeping machine -- and the 399 -- should appeal widely for sub-entry-level computer and terminal business. NCR is also moving strongly in the autotransaction marketplace (page 12). On the computer front, the price/performance improved Century 101 and 251 -- plus the 300 -- seem to offer customers adequate upgrade paths until the joint CPU development program with CDC is announced.

CDC -- Recently (page 16), the "maker of the world's most powerful computers" transformed established product designs into integrated circuits and called it Cyber 170, introduced a Network Operating System, and completely unbundled software. This should probably more than supply customer needs until the series being developed with NCR is ready. For all its clout with big number crunchers, however, CDC is one of the most diversified suppliers in the information processing industry. Following last year's acquisition of Service Bureau Corp., services now account for about one fourth of CDC's computer-related revenues; also, it is the largest supplier of IBM plug-compatible peripherals.

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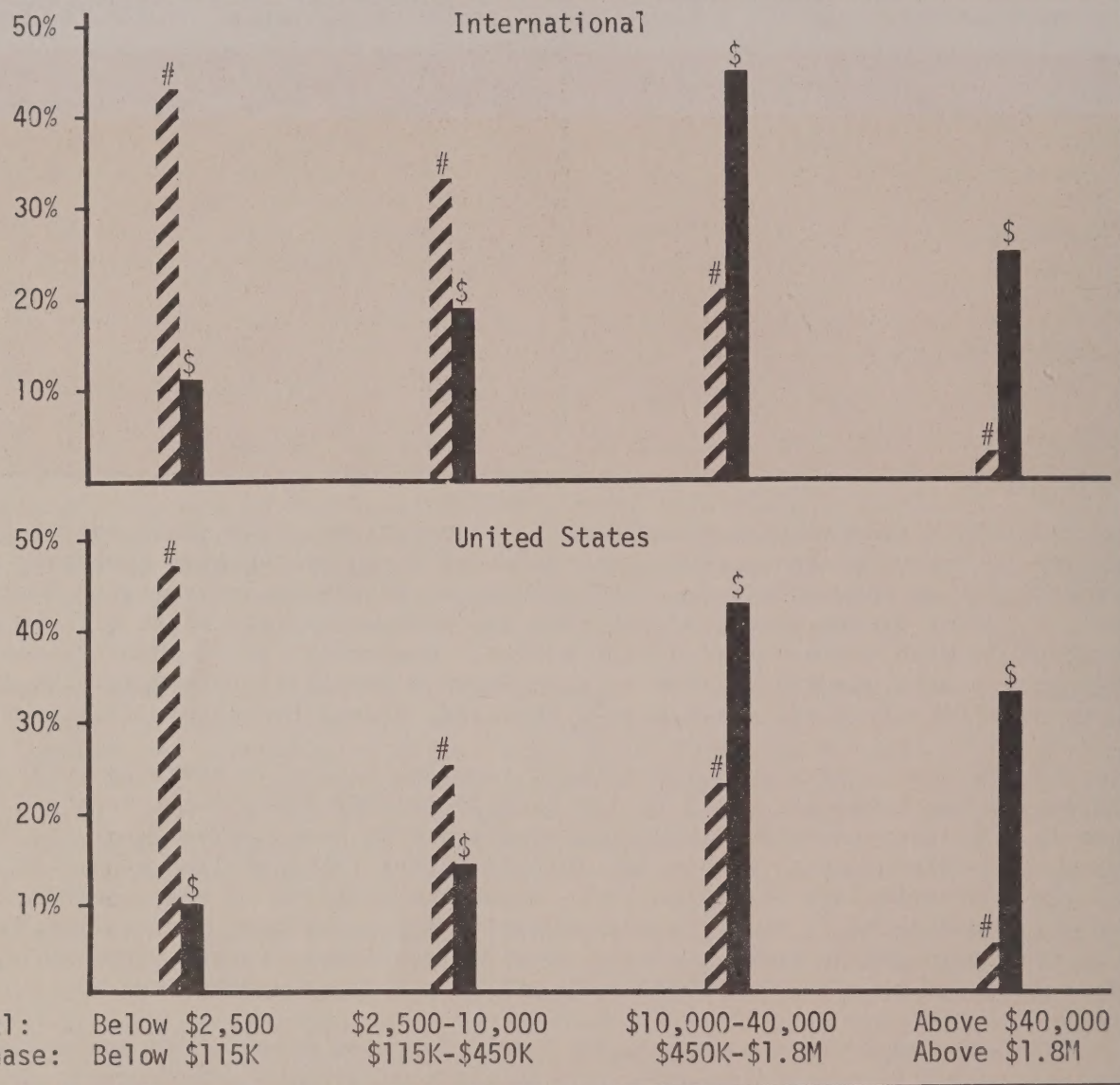
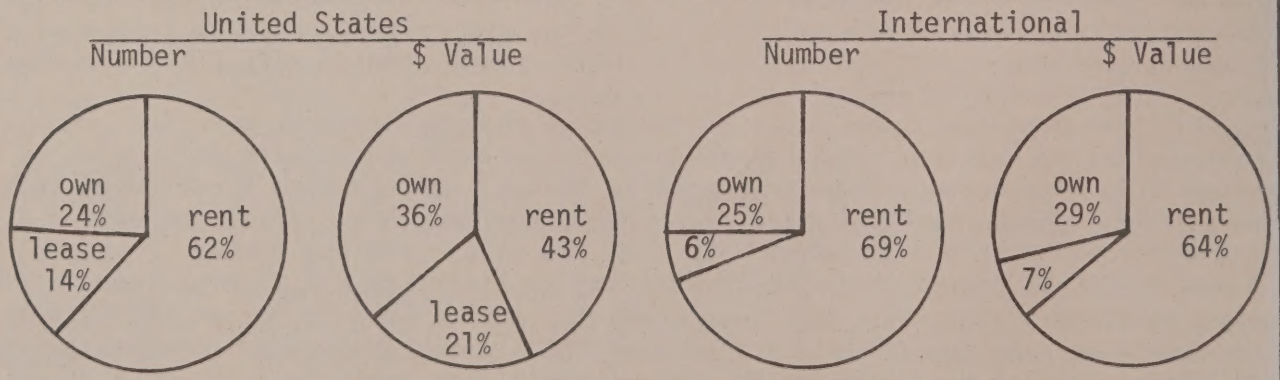
PRICE CLASS DISTRIBUTION OF GENERAL-PURPOSE COMPUTERS INSTALLED, YEAREND 1973
(U.S.-Based Manufacturers; Copyright 1974 by International Data Corporation)



Rental:	Below $2,500	$2,500-10,000	$10,000-40,000	Above $40,000
Purchase:	Below $115K	$115K-$450K	$450K-$1.8M	Above $1.8M

DISTRIBUTION OF GENERAL-PURPOSE COMPUTERS BY ACQUISITION METHOD
(Installed, Yearend 1973; Copyright 1974 by International Data Corporation)



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WORLDWIDE COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1966	10,500	44,300	$ 3,825	$ 13.7
1967	18,450	55,900	5,420	18.4
1968	17,600	71,400	6,422	23.7
1969	19,100	87,000	6,805	29.3
1970	23,100	105,800	6,715	34.2
1971	27,800	129,200	7,077	38.5
1972	40,900	160,300	8,535	42.5
1973	55,350	204,800	$ 9,575	$ 47.9
1974	69,500	266,000	10,385	54.0
1975	89,500	348,500	10,330	60.6
1976	117,000	457,500	11,220	67.3
1977	147,000	595,000	13,130	74.8
1978	170,000	753,000	15,670	84.7
		UNITED STATES		
1966	7,000	31,100	$ 2,690	$ 9.9
1967	12,000	37,000	3,775	13.1
1968	11,000	46,500	4,367	16.6
1969	12,700	56,800	4,430	20.3
1970	14,600	68,300	3,920	23.0
1971	17,600	83,200	4,177	25.1
1972	27,400	104,000	5,395	26.8
1973	38,700	133,250	$ 5,945	$ 29.9
1974	47,300	171,500	6,350	33.5
1975	59,500	222,500	5,775	37.2
1976	78,000	290,500	6,120	40.9
1977	100,000	376,000	7,375	45.0
1978	112,000	481,000	8,720	50.4
		INTERNATIONAL		
1966	3,500	13,200	$ 1,135	$ 3.8
1967	6,450	18,900	1,645	5.3
1968	6,600	24,900	2,055	7.1
1969	6,400	30,200	2,375	9.0
1970	8,500	37,500	2,795	11.2
1971	10,200	46,000	2,900	13.4
1972	13,500	56,300	3,140	15.7
1973	16,650	71,550	$ 3,630	$ 18.0
1974	22,200	94,500	4,035	20.5
1975	30,000	126,000	4,555	23.4
1976	39,000	167,000	5,100	26.4
1977	47,000	219,000	5,755	29.8
1978	58,000	272,000	6,950	34.3

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GENERAL PURPOSE COMPUTER MARKET (GROUP A)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1966	9,000	39,100	$ 3,700	$ 13.1
1967	15,700	48,000	5,200	17.6
1968	13,000	59,000	6,150	22.6
1969	11,000	66,700	6,450	27.8
1970	12,000	74,800	6,300	32.4
1971	14,300	85,200	6,700	36.3
1972	18,300	94,800	8,035	39.8
1973	21,450	106,800	$ 8,805	$ 44.5
1974	19,500	120,000	9,300	49.5
1975	18,500	133,500	8,900	54.7
1976	21,000	148,500	9,400	59.6
1977	26,000	167,000	10,900	65.1
1978	26,000	183,000	13,000	72.5
		UNITED STATES		
1966	6,000	27,100	$ 2,600	$ 9.4
1967	10,000	31,000	3,600	12.4
1968	7,400	37,000	4,150	15.7
1969	6,000	40,700	4,150	19.1
1970	5,700	43,800	3,600	21.5
1971	7,600	49,200	3,900	23.3
1972	10,700	54,000	5,035	24.7
1973	14,000	62,250	$ 5,405	$ 27.3
1974	11,300	70,000	5,600	30.1
1975	9,500	77,000	4,800	32.9
1976	11,000	85,000	4,900	35.4
1977	16,000	97,000	5,900	38.2
1978	14,000	106,000	7,000	42.0
		INTERNATIONAL		
1966	3,000	12,000	$ 1,100	$ 3.7
1967	5,700	17,000	1,600	5.2
1968	5,600	22,000	2,000	6.9
1969	5,000	26,000	2,300	8.7
1970	6,300	31,000	2,700	10.9
1971	6,700	36,000	2,800	13.0
1972	7,600	40,800	3,000	15.1
1973	7,450	44,550	$ 3,400	$ 17.2
1974	8,200	50,000	3,700	19.4
1975	9,000	56,500	4,100	21.8
1976	10,000	63,500	4,500	24.2
1977	10,000	70,000	5,000	26.9
1978	12,000	77,000	6,000	30.5

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DEDICATED APPLICATION COMPUTER MARKET (GROUP B)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Million Value In Use
		WORLDWIDE		
1966	1,500	5,200	$ 125	$ 587
1967	2,750	7,900	220	807
1968	4,600	12,400	272	1,079
1969	8,100	20,300	355	1,433
1970	11,100	31,000	415	1,845
1971	13,500	44,000	377	2,216
1972	22,600	65,500	500	2,703
1973	33,900	98,000	$ 770	$ 3,453
1974	50,000	146,000	1,085	4,503
1975	71,000	215,000	1,430	5,878
1976	96,000	309,000	1,820	7,608
1977	121,000	428,000	2,230	9,703
1978	144,000	570,000	2,670	12,173
		UNITED STATES		
1966	1,000	4,000	$ 90	$ 506
1967	2,000	6,000	175	681
1968	3,600	9,500	217	898
1969	6,700	16,100	280	1,177
1970	8,900	24,500	320	1,494
1971	10,000	34,000	277	1,766
1972	16,700	50,000	360	2,116
1973	24,700	71,000	$ 540	$ 2,641
1974	36,000	101,500	750	3,366
1975	50,000	145,500	975	4,301
1976	67,000	205,500	1,220	5,456
1977	84,000	279,000	1,475	6,836
1978	98,000	375,000	1,720	8,421
		INTERNATIONAL		
1966	500	1,200	$ 35	$ 81
1967	750	1,900	45	126
1968	1,000	2,900	55	181
1969	1,400	4,200	75	256
1970	2,200	6,500	95	351
1971	3,500	10,000	100	450
1972	5,900	15,500	140	587
1973	9,200	27,000	$ 230	$ 812
1974	14,000	44,500	335	1,137
1975	21,000	69,500	455	1,577
1976	29,000	103,500	600	2,152
1977	37,000	149,000	755	2,867
1978	46,000	195,000	950	3,752

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DEDICATED APPLICATION COMPUTER DEMAND SEEMS INSATIABLE; 1974 SHIPMENTS TO HIT 50,000 LEVEL WORTH OVER $1 BILLION

The marketplace boom for dedicated application computers -- mostly minis -- that began last year accelerated during 1973 and it looks as if the end is nowhere in sight (page 9). Shipments were up 54% to the $770 million level worldwide for U.S.-based manufacturers . . . and all indications are for another 40% increase this year to just over $1 billion. And with the average system shipped holding at the $22,000 level, this means shipments of 50,000 Group B computers, of which some 70% will be in the United States.

Who needs all this processing capacity? The list of applications continues to grow. About 60% of the minicomputers shipped in the U.S. (worth almost half the total value) go first to an OEM manufacturer for inclusion in shared processor (data entry) systems, intelligent terminals, turnkey systems for small business, and a growing number of consumer-oriented (autotransaction) products such as point-of-sale systems, automated bank tellers, credit authorization systems, and even automated gas stations.

Minis are used in industrial automation across the board, as concentrators in teleprocessing networks, for plant security, and in special applications such as traffic light control. Furthermore, IBM's entry -- the sensor-based System/7 -- is broadening the market rather than increasing competition as it connects more and more "live" applications to centralized System/370s.

Some dedicated application computers, such as IBM's System/7, can be relatively expensive; others, like those from Microdata, very inexpensive. Across-the-board suppliers such as Digital Equipment have a wide mix, so market share tends to be the same by number or dollar. The primary reason average system cost continues to remain upwards of $20,000 is because of peripherals, even though a number of suppliers -- Caelus, Centronics, Data Products, Diablo, Iomec, Pertec -- are specializing in mini-peripherals. Here's a breakdown of system shipments for the major suppliers of dedicated application computers in 1973:

Company	# Units	% Total	$M Value	% Total
Digital Equipment	10,800	31.9	$ 242	31.4
IBM	1,500	4.4	90	11.7
Hewlett Packard	2,450	7.2	83	10.8
Honeywell	1,060	3.1	69	9.0
Data General	4,400	13.0	58	7.5
General Automation	2,550	7.5	$ 44	5.7
Varian	1,280	3.8	32	4.2
Interdata	780	2.3	19	2.5
Computer Automation	2,730	8.1	15	1.9
Xerox	140	0.4	14	1.8
Systems Eng. Labs	85	0.3	$ 13	1.7
Modular Computer	485	1.4	12	1.6
Microdata	1,550	4.6	9	1.2
Digital Computer Cont.	900	2.7	5	0.6
All Other	3,190	9.3	65	8.4
TOTALS	33,900	100.0	$ 770	100.0

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PLUG-COMPATIBLE MEMORY EQUIPMENT INSTALLED IN UNITED STATES
(International Data Corporation Estimates at IBM Purchase Price, Copyright 1974)
($ Million In Use at Yearend)

	1970	1971	1972	1973	1974
Tape Drives	$ 185	$ 210	$ 276	$ 342	$ 407
Disk Drives	370	480	522	640	772
360 Memory	8	79	212	308	350
370 Memory			5	35	125
TOTAL	$ 563	$ 769	$1,015	$1,325	$1,654

PLUG-COMPATIBLE MANUFACTURERS FACE CHALLENGES DESPITE POST-TELEX GROUNDRULES

When Judge Christensen found in his Telex/IBM decision that the business of supplying peripherals for IBM computers was indeed a market, he essentially legitimatized the child . . . but he didn't tell the competitors how to grow up. Several major PCMers are suing in the wake of Telex, and confirmation of Christensen's decision by the Denver appeals court (see page 16) could well lead to eventual damage awards or monetary settlements from IBM. But a one-shot infusion of cash is not the answer to the business challenges that will determine long-term profitability for PCM suppliers. Some of the basic questions:

- What is the proper mix of sales to OEM accounts and leasing companies versus rentals to end users? Calcomp has found that an even distribution seems to work. How do PCMs attain this mix?

- What about obsolescense? A shorter market life is inherent for a product that must be virtually a copy of IBM's offering. Will the relief provided by the court go far enough toward solving this problem?

- What about leasing company competition? When a new product is first announced, third-party leasing companies usually acquire peripherals from IBM until PCM offerings are ready. These provide competition when there is a scramble for remarketability of older peripherals.

- And what about the memory business? The big potential this year is in 370 (semiconductor) memory. Long-term, however, the semiconductor manufacturers loom as potential competition . . . and solid-state is obviously the direction of the entire peripheral business.

- Also, of most long-term significance, what about changing system design trends? As electronics components become physically smaller, and computer systems get more complex, there is true design advantage to including peripheral controls within the central computer itself. This leaves less and less profitable business for PCMers.

Questions such as these -- plus the plain difficulty of keeping up with IBM technological developments such as the 3340 drive which now is a combination drum and disk -- set the long-term stage for viability in the plug-compatible marketplace. Not all the PCM suppliers' problems are going to be solved in the courtroom. On the other hand, the IBM customer base is essentially a world unto itself -- other mainframers often have a better chance competing with one another than with IBM -- so the questions are worth solving. The rewards are great.

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WIDE-OPEN SERVICES AND AUTOTRANSACTION MARKETS HOLD BIG GROWTH POTENTIAL

As the tables and charts on these two pages indicate, there is plenty of growth potential in at least two overlapping sectors . . . and room for new participants: The top ten suppliers of computer services account for only 30% of the $2.2 billion business; in autotransaction, nine major suppliers account for only 36% of what's already a billion-plus dollar business growing more than 40% a year. Both sectors are fragmented, and likely to remain so. They are composed of scores of business segments, each requiring considerable industry/applications knowhow.

Services, as IDC has defined it for some time (EDP/IR Sept.15,1972) is best examined as a matrix (page 13) of access methods and types of use. Batch modes of operation are quickly giving way to remote batch or Rair (remote access/immediate response) as teleprocessing and networking concepts take hold. Traditional batch operations -- supplying backup or alternate sources of computer power, as it were -- will lose relative share to communications-oriented services, more and more of which cater to the specific needs of a particular type of customer.

At present, the four leading companies in the computer services market are Control Data, currently operating at the $150 million level after its acquisition of Service Bureau Corp.; Electronic Data Systems, at the $100 million level; GE and Automatic Data Processing, each of which had revenues of about $85 million in 1973. The variety of services offered by these participants illustrates the scope of computer services. Several large companies -- with virtually no computer service revenue at present -- have stated business objectives of becoming industry leaders by 1980; thus, a certain amount of consolidation in services is expected.

Autotransaction is the concept IDC developed during 1973 to describe computer-related products and services that are designed with a particular business sector and/or specific application in mind, that involve transactions to and from a data base, and that are for sale. In addition to that portion of the services industry falling into this category, autotransaction includes the booming field of information appliances such as point-of-sale and special banking terminals.

Leaders in autotransaction, during 1973, were Bunker Ramo, EDS, NCR, and Singer, which combined had revenues of about $300 million. IBM announced products for banking and retailing last year, so must be contended with as an entrant; however, its domination is by no means a foregone conclusion. Singer is the leader in retail POS; NCR is coming on strong there, and about to announce a family of terminals for banking; Univac as well as the established POS companies is aiming at the supermarket area, where Bunker Ramo has about half the business and MSI Data has great potential to build on its customer base for cassette/recorders.

AUTOTRANSACTION INDUSTRY -- WORLDWIDE REVENUES OF U.S. SUPPLIERS
(Estimates in $ Millions; Copyright 1974 by International Data Corporation)

	1972	1973	1974	1975	1976	1977	1978
Batch Transaction	$ 285	$ 360	$ 440	$ 515	$ 595	$ 685	$ 790
Other Computer Services	270	410	605	860	1185	1580	2065
Information Appliances	150	340	640	1090	1740	2700	4050
Turnkey Systems	40	80	150	265	450	725	1085
Miscellaneous Products	105	145	205	285	390	515	660
TOTAL	$ 850	$1335	$2040	$3015	$4360	$6205	$8650

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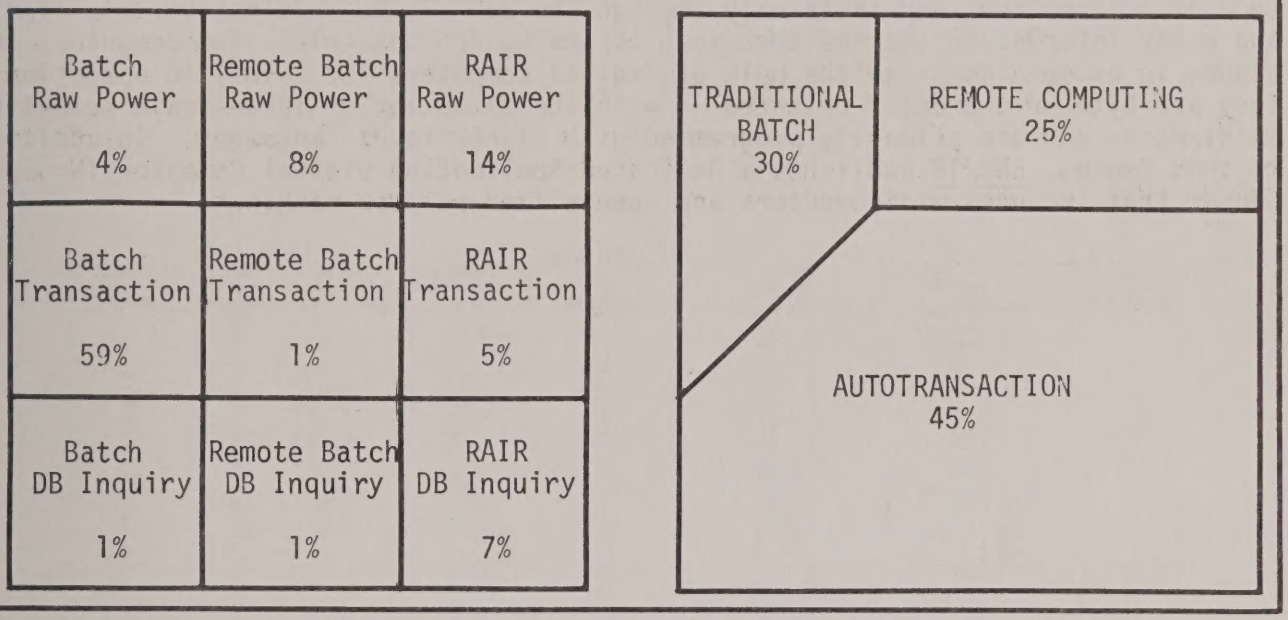
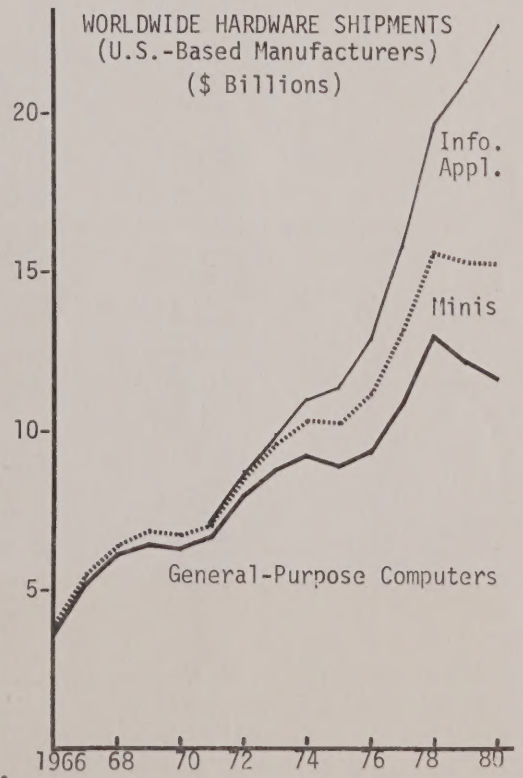
CHANGING STRUCTURE OF COMPUTER SERVICES INDUSTRY
(Worldwide Revenues of U.S.-Based Companies; IDC Estimates Copyright 1974)



The new (synergistic) computer industry

Just as autotransaction represents the exciting portion of the services industry, information appliances and associated systems will be important to hardware growth. The lowest line at right -- Group A shipments -- provides a reference for examining total hardware shipments. To it is added Group B shipment figures and the preliminary autotransaction figures from across the page. Thus, despite the maturing, cyclical posture the general-purpose segment is developing, the total shipment curve retains the shape most people were drawing a few years ago.

And the components hint at coming synergistic effects: Special terminals will need more general-purpose backup for data bases; systems will include minis for communications, control, and local processing. The growth of services (above) will foster user purchase of more special terminals. Likewise, new types of information appliances will lead to cost savings, better ways of doing business, and more sales of terminals. It's a succession of supportive cycles that require each other -- it's synergistic.



During the coming year, International Data Corporation plans increased research efforts in these growing areas; the total growth of the information appliance curve, for example, is really the sum of many startup situations. Results will be reported on a regular basis in AUTOTRANSACTION Industry Report.

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General Purpose Digital Computer (Group A) Census, shown below, are based on the best information available to the International Data Corporation, but are estimates. Computer manufacturers, as a rule, do not directly supply this type of information, and it is only through the use of IDC's extensive data files and other information sources that such estimates are possible. The computers included in Group A comprise the bulk of digital computers (by value) in operation. They are byte or character oriented -- with the exception of large-scale scientific machines -- and are primarily programmed with higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and specialized-purpose machines.

AS OF JANUARY 1, 1974

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	B-200 Series	$ 5,600	11/61	105	75	180	X
	B-300 Series	$ 5,200	7/65	375	70	445	X
	B-500	$ 6,000	11/68	455	450	905	X
	B-705/711	$ 1,300	3/73	100	60	160	215
	B-1712	$ 1,950	8/72	130	46	176	150
	B-1714	$ 2,200	8/72	205	110	315	180
	B-1726	$ 5,300	2/73	115	18	133	140
	B-1728	$ 7,700	8/73	20	9	29	90
	B-2500	$ 8,200	2/67	260	140	400	X
	B-2700	$ 8,700	8/72	90	70	160	90
	B-3500	$ 14,700	5/67	635	355	990	X
	B-3700	$ 20,000	11/72	38	7	45	45
	B-45/4700	$ 27,000	10/71	110	80	190	65
	B-5500	$ 35,000	3/63	82	30	112	X
	B-5700	$ 29,500	12/70	18	5	23	8
	B-65/6700	$ 50,000	11/69	60	50	110	15
	B-7700	$120,000	8/73	3	1	4	15
	Subtotal			2,801	1,576	4,377	1,013
Control Data Corp.	G-20	$ 19,600	4/61	3	5	8	X
	1604/A/B	$ 42,000	1/60	17	4	21	X
	31/3150	$ 9,000	12/64	86	48	134	X
	3170	$ 17,500	12/70	14	14	28	X
	3200	$ 14,700	5/64	49	44	93	X
	3300	$ 28,800	9/65	117	90	207	X
	3400	$ 23,700	11/64	4	8	12	X
	3500	$ 26,000	1/64	10	17	27	X
	3600	$ 48,000	6/63	18	15	33	X
	3800	$ 53,000	12/65	19	3	22	X
	6200	$ 39,000	11/70	2	6	8	X
	Cyber-72	$ 33,000	10/71	17	31	48	11
	6400	$ 54,000	5/66	57	49	106	X
	Cyber-73	$ 47,000	3/72	8	24	32	9
	6500	$ 68,000	12/67	20	12	32	X
	6600	$115,000	8/64	58	31	89	X
	Cyber-74	$105,000	3/72	2	6	8	4
	6700	$125,000	7/70	3	0	3	X
	7600	$165,000	1/69	9	6	15	X
	Cyber-76	$165,000	3/72	1	3	4	2
	Star-100	$250,000	8/73	1	0	1	2
	Subtotal			515	416	931	28
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	16	8	24	X
	1040/1050	$ 13,300	10/67	173	69	242	19
	1055	$ 22,000	12/71	24	8	32	12
	1070/1077	$ 30,000	6/72	12	1	13	6
	Subtotal			225	86	311	37
Honeywell	Gamma 10	$ 2,500	7/64	0	1,000	1,000	X
	Gamma 30	$ 9,900	2/62	0	150	150	X
	G-5X Series	$ 1,550	1/66	620	2,900	3,520	200
	G-100 Series	$ 4,000	4/66	285	1,550	1,835	X
	G-200 Series	$ 13,700	4/61	195	53	248	X
	G-405/410	$ 9,000	2/68	18	8	26	X
	G-415/420	$ 14,000	5/64	135	190	325	X
	G-425/430	$ 17,000	6/64	43	102	145	X
	G-435/440	$ 22,000	9/65	95	48	143	X
	G-615	$ 55,000	6/69	4	22	26	X
	G-625	$ 65,000	4/65	2	3	5	X
	G-635	$ 80,000	5/65	47	18	65	X
	G-645	$120,000	7/66	2	1	3	X
	G-6025	$ 21,800	11/73	10	2	12	63
	G-6030/40	$ 33,000	6/71	83	95	178	55
	G-6050/60	$ 46,500	7/71	74	26	100	37
	G-6070/80	$ 61,500	7/71	40	13	53	19
	G-6180	$100,000	2/74	-	-	-	4
	G-Subtotal			1,653	6,181	7,834	378
	H-105	$ 2,500	11/71	470	105	575	135
	H-110	$ 2,600	9/68	155	170	325	X
	H-115	$ 5,300	3/70	1,100	340	1,440	190
	H-120	$ 4,600	1/66	420	175	595	X
	H-125	$ 7,900	12/67	85	325	410	X
	H-200	$ 6,400	3/64	480	250	730	X
	H-2020	$ 2,350	2/73	215	20	235	140
	H-2030	$ 5,050	1/73	38	5	43	35
	H-2040	$ 9,000	4/72	230	73	303	90
	H-1015	$ 12,500	4/71	95	53	148	25
	H-2050	$ 14,100	4/72	135	35	170	50
	H-12/1250	$ 12,000	2/66	315	160	475	X
	H-2015	$ 17,800	2/71	100	44	144	25
	H-2060	$ 18,500	4/72	60	8	68	20
	H-2200	$ 19,600	1/66	120	48	168	X
	H-2070	$ 23,000	5/72	39	4	43	13
	H-3200	$ 26,900	2/70	64	29	93	X
	H-4200	$ 31,000	9/68	29	5	34	X
	H-2088	$ 44,000	4/72	4	1	5	2
	H-8200	$ 73,000	2/69	22	4	26	X
	H-4/1400	$ 13,200	12/61	28	25	53	X
	H-800	$ 28,500	12/60	35	11	46	X
	H-1800	$ 46,000	7/64	7	4	11	X
	H-Subtotal			4,246	1,894	6,140	725
	HIS Totals			5,899	8,075	13,974	1,103

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AS OF JANUARY 1, 1974

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
IBM	System 3/6	$ 1,700	12/70	3,015	1,710	4,725	785
	System 3/10	$ 2,420	1/70	15,500	6,930	22,430	2,800
	System 3/15	$ 4,550	3/74	-	-	-	1,400
	360/20	$ 3,600	12/65	3,402	4,845	8,247	X
	360/22	$ 5,800	7/71	1,105	300	1,405	X
	370/115	$ 6,650	4/74	-	-	-	1,700
	360/25	$ 7,500	10/68	764	1,115	1,879	X
	370/125	$ 9,800	6/73	770	415	1,185	1,200
	360/30	$ 11,000	6/65	3,104	2,475	5,579	X
	370/135	$ 16,225	5/72	2,200	1,010	3,210	1,000
	360/44	$ 14,200	7/66	68	82	150	X
	360/40	$ 19,400	6/65	1,510	1,775	3,285	X
	370/145	$ 27,800	7/71	1,700	790	2,490	515
	360/50	$ 32,100	8/65	662	560	1,222	X
	370/155	$ 53,350	2/71	1,190	510	1,700	X
	370/158	$ 59,200	5/73	147	100	247	425
	360/65	$ 68,000	11/65	482	225	707	X
	370/165	$ 95,000	6/71	210	63	273	X
	370/168	$110,200	7/73	50	12	62	150
	360/67	$112,000	6/66	39	14	53	X
	360/75	$ 94,000	1/66	33	16	49	X
	360/85	$141,000	10/69	4	4	8	X
	360/9X	$150,000	11/67	14	2	16	X
	370/195	$194,600	3/71	19	4	23	8
	1130	$ 2,300	2/66	2,720	1,900	4,620	X
	1401	$ 3,700	9/60	1,100	840	1,940	X
	1401-G	$ 2,300	5/64	90	40	130	X
	1401-H	$ 1,300	6/67	53	44	97	X
	1410	$ 17,000	11/61	97	54	151	X
	1440	$ 4,700	4/63	245	250	495	X
	1460	$ 9,800	10/63	55	40	95	X
	1620	$ 2,700	9/60	325	230	555	X
	7010	$ 26,000	10/63	13	7	20	X
	7030	$160,000	5/61	3	1	4	X
	704	$ 32,000	12/55	1	1	2	X
	7040	$ 25,000	6/63	9	16	25	X
	7044	$ 36,500	6/63	8	10	18	X
	705	$ 38,000	1/56	3	3	6	X
	7070-74	$ 27,000	3/60	101	36	137	X
	7080	$ 60,000	8/61	48	1	49	X
	7090/94	$ 70,500	8/60	72	11	83	X
	Subtotal			40,931	26,441	67,372	9,983
NCR	Century-50	$ 1,950	2/71	895	45	940	160
	Century-100	$ 2,980	9/68	1,150	800	1,950	X
	Century-101	$ 2,750	10/72	300	25	325	140
	Century-200	$ 7,900	9/69	640	360	1,000	60
	Century-251	$ 10,000	11/73	15	10	25	75
	Century-300	$ 20,000	2/72	25	17	42	17
	304	$ 10,000	1/60	6	0	6	X
	310	$ 1,000	5/61	15	10	25	X
	315	$ 5,000	5/62	325	270	595	X
	315-RMC	$ 11,800	9/65	55	45	100	X
	390	$ 800	5/61	250	160	410	X
	500	$ 1,100	10/65	765	1,550	2,315	X
	Subtotal			4,441	3,292	7,733	452
Philco	1000	$ 7,000	6/63	15	1	16	X
	210/211	$ 40,000	10/58	10	1	11	X
	212	$ 52,000	1/63	8	1	9	X
Singer	System 10	$ 2,500	10/70	870	640	1,510	475
Standard Computer	IC-4000	$ 9,000	9/68	4	0	4	X
	IC-6000	$ 16,000	5/67	3	0	3	X
	IC-7000	$ 17,000	6/69	7	0	7	X
Univac	I/II	$ 25,000	3/51	3	2	5	X
	III	$ 25,400	8/62	35	37	72	X
	SS-80/90	$ 8,000	8/58	21	23	44	X
	418-I/II	$ 13,700	6/63	74	78	152	X
	418-III	$ 19,600	7/69	42	52	94	10
	491/492	$ 27,000	12/61	17	12	29	X
	494	$ 41,400	2/66	52	41	93	X
	1004	$ 1,000	2/63	900	940	1,840	X
	1005	$ 1,630	4/66	705	200	905	X
	1050	$ 8,800	9/63	182	140	322	X
	1103/5	$ 35,000	12/50	0	3	3	X
	1106	$ 40,000	12/69	67	93	160	30
	1107	$ 57,000	10/62	7	13	20	X
	1108	$ 68,000	9/65	135	97	232	X
	1110	$ 79,000	6/72	11	22	33	22
	9200	$ 2,300	6/67	1,550	935	2,485	X
	9300	$ 4,050	9/67	895	880	1,775	X
	9400	$ 11,600	5/69	250	270	520	55
	9700	$ 21,600	8/72	11	17	28	X
	90/60	$ 16,200	1/74	-	-	-	NA
	90/70	$ 22,000	11/73	3	0	3	NA
	Subtotal			4,960	3,855	8,815	117
	301	$ 6,600	10/60	166	8	174	X
	501	$ 16,100	6/59	15	0	15	X
	3301	$ 22,700	7/64	65	0	65	X
	Spectra 70/15	$ 4,000	9/65	13	0	13	X
	Spectra 70/25	$ 7,000	9/65	2	2	4	X
	Spectra 70/35	$ 11,800	1/67	98	5	103	X
	Spectra 70/45	$ 22,600	11/65	266	18	284	X
	Spectra 70/46	$ 37,400	11/68	34	2	36	X
	Spectra 70/55	$ 34,900	11/68	6	2	8	X
	Spectra 70/60	$ 40,500	9/70	18	0	18	X
	Spectra 70/61	$ 47,200	3/71	10	0	10	X
	Spectra 1600	$ 3,600	1/69	67	0	67	X
	Spectra 70/2	$ 11,500	7/71	115	0	115	X
	Spectra 70/3	$ 18,900	10/71	19	0	19	X
	Spectra 70/6	$ 29,300	10/71	45	0	45	X
	Spectra 70/7	$ 36,300	10/71	22	0	22	X
	Subtotal			961	37	998	X
	Total			5,921	3,892	9,813	117
Xerox	Sigma-5	$ 11,500	8/67	265	60	325	X
	Sigma-6	$ 20,000	11/70	33	7	40	10
	Sigma-6E	$ 6,100	-	-	-	-	-
	Sigma-7	$ 24,000	12/66	100	25	125	X
	Sigma-8	$ 19,000	9/71	17	5	22	7
	Sigma-9	$ 44,000	11/71	32	7	39	14
	530	$ 3,500	8/73	60	5	65	NA
	940	$ 24,000	4/66	60	5	65	X
	9300	$ 8,500	11/64	30	5	35	X
	Subtotal			597	119	716	31
	TOTALS			62,247	44,540	106,787	13,239

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• A NEW FAMILY OF "NETWORK" COMPUTERS CALLED CYBER 170 -- designed to replace Control Data's four-year-old Cyber 70 line -- was introduced in Toronto last week, along with a new Network Operating System (NOS), and a completely unbundled price list that could offer new opportunities for independent software packagers. On both the hardware and software fronts, the announcement represented still another step along the path CDC charted for itself more than 10 years ago -- big computers for centralized processing in network environments.

The new family reaffirms CDC's aim to sell networking power. With NOS and a new microprogrammable communications processor, Cyber 170 systems can handle up to 512 remote terminals for batch, timesharing and transaction processing all at once. And CDC will be concentrating all its sales efforts on extensive network applications in science/engineering, financial data, process control, and other uses. The total unbundling policy means that users may purchase only the software features they need -- or none at all, if they want to design an entire system themselves. Typically, CDC estimates, software will account for about 25% of system costs.

On the hardware side, the 170 family retains the basic architecture of the ancestral 6600 -- 60-bit word length, heirarchical memory and phalanxes of peripheral processors -- but the machinery has been brought up-to-date with MOS main memory and fast ECL logic circuitry that combine to increase speed and cut cabinet sizes in half. CDC roughly compares the processing power of the four models announced -- numbered 172 through 175 -- to IBM Systems 370/155 through 168. The superscale 7600 series will continue to be the company's top-of-the-line family.

• MOST OF THE MAJOR MAINFRAMERS REPORTED HEALTHY GROWTH during the first three months of 1974, despite downturns in other sectors of industry. IBM earned $431 million on revenues of $3 billion, a per share increase of 25% over 1Q73. Burroughs reported earnings up 31% to $21 million on revenues of $323 million. Honeywell also reported record sales and earnings. NCR continued along the road toward recovery of profitability with a 62% increase in earnings . . . while higher revenues on Control Data's computer operations were offset by a drop in profits from its Commercial Credit subsidiary.

• ORAL ARGUMENTS IN IBM'S APPEAL OF THE TELEX DECISION -- and Telex's appeal of the $20 million counterclaim award -- will be heard before the Tenth Circuit Court of Appeals May 14 in Oklahoma City. All the appeal and reply briefs have already been filed, and the appellate court's decision is expected within 60 days of next month's session.

In its appeal briefs IBM attacked Judge Christensen's findings on just about every point. The giant still argues that the market for plug-compatible peripherals is not a single "relevant market" . . . that it does not hold or exercise "the economic ability to charge unreasonably high prices and to exclude competition" . . . that its price cuts were competitive rather than anti-competitive and did not stop independents from entering the field. To call its actions predatory, IBM insists, is "an attack upon competition and an assault on the very heart of the Sherman Act."

Telex, on the other hand, strongly contests the finding that it "stole" trade secrets from IBM. It argues that IBM's trade secrets are not protectible because IBM is a monopolist; that the "secrets" were public knowledge anyway; and that in any case Telex, far from stealing IBM designs, improved upon them. Telex also accused IBM of waging a campaign to suppress smaller competitors with specious suits alleging trade secret theft.

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Review and Forecast

EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MARCH 30,1973 • VOL.8,NO.11 P.J.McGOVERN,EDITOR

Toward rational growth

SHIPMENTS UP 24% AS TELEPROCESSING GROWTH PHASE BEGINS

A lot of catch-up buying by users combined with the product cycle upswing, business recovery and its associated larger processing burden, and the start of a new, teleprocessing growth phase to make 1972 a healthy one for the computer industry.

Total revenues of U.S.-based computer companies, as measured by International Data Corporation, publisher of EDP Industry Report, were up almost 17% (page 4) to the $14.5 billion level. This isn't a return to the 30% days of the late 1960s, but it's a far sight better than the 10% level hit in 1969, 1970, and 1971.

What's most important, the rate should continue. Computer using management has begun to budget for long-touted teleprocessing applications, and this spending -- part of long-range plans at major companies -- should continue into the late 1970s, at least. It will affect almost every sector of the industry, and push total revenues to $28.6 billion -- twice that of 1972 -- by 1977.

Based on IDC surveys of user intentions, discussions with suppliers, and general examination of industry developments, EDP/IR once again has prepared its Review and Forecast of the computer industry. There's finally a true air of optimism, as this issue describes. Highlights of the year past and the times ahead indicate the broad nature of the industry's more rational growth expectations:

- As computer shipments grew almost 24% to the $8.9 billion level last year, the heavy replacement cycle peaked (page 3). The 60% "discontinuance" level in 1972 cleaned house in the rental base; so for the next several years, retirements will hover at the 40% level and net shipments can grow.

- Shipments of dedicated application computers (including minicomputers) zoomed up 55% to $560 million last year. Part of this was catch-up buying (page 9), but EDP/IR sees no dearth of mini applications. Revenues to suppliers should reach $1.7 billion by 1977.

- All signs are encouraging (page 11) for computer industry segments most closely related to teleprocessing -- remote services and terminals of all types. IDC expects almost one million computer terminals to be operating in the U.S. by yearend 1977.

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- Total user spending topped the $20 billion level in the U.S. last year and will grow tranquilly at 12%, disturbed by no single development. The portion of budgets spent with outside vendors was 55% in 1972 and should increase to 56.5% by 1974. This seems to reflect IBM's pitch for virtual storage: Spend on hardware, save more in "people" costs.

IBM's computeryear

Indeed, most of the important industry developments in 1972 emanated from Armonk, or at least White Plains. There were some important reactions to IBM's extremely aggressive attack mounted in its "new approach to computer economics," but most mainframers ambled along, introducing new or improved-performance versions of mature product lines . . . concentrating on profits. Most were successful. Burroughs, continuing to ignore IBM's "leadership," brought out the only really new products and laid plans to push computers further down into the small business segment of industry.

But IBM certainly set the pace . . . in economics, as has come to be expected, and technologically as well:

- In August (EDP/IR Aug.15,1972), the real System/370 stood up. IBM essentially said that virtual storage was the way it had selected for users to move into teleprocessing and large data base usage.

- The prospect of increased hardware function bundling -- of making the CPU a set of many processors, as it were -- came through as the central theme of the 370/125 (EDP/IR Oct.6,1972) and the 370/115 earlier this month. In larger computers, multi-processors are now available and will probably become the standard.

- Low-cost and vast semiconductor memories will support the two new directions described above. Also, IBM seems to be making a firm stand to keep this CPU element (as it prices memory) out of the hands of the independents.

- A new generation of disk drives, announced at the same time as the 370/115, appeared with the introduction of the 3340. With heads inside the pack -- and details not announced -- this "Winchester" drive brings lower cost secondary storage to users and presents new challenges to independent peripheral and supplies manufacturers alike.

- With its announcement of the 3740 diskette data recorder (EDP/IR Feb.19,1973), IBM finally moved away from the punched card and accepted a new approach to data entry. Although this move could be described as following an industry trend, IBM has done it in such a way as to promote remote processing and perhaps set new standards.

- Finally, but perhaps of most consequence to industry participants outside the mainframe sector, IBM has quietly shifted its groundrules for equipment acquisition, promoting longer term commitments on the part of users -- "lock in's," if you will. The extended term lease plan offered with all new peripherals requires a two-year commitment (and carries a stiff cancellation penalty) but provides the same purchase-to-monthly payment ratio as older rental prices. The four-year term lease eliminates overtime charges.

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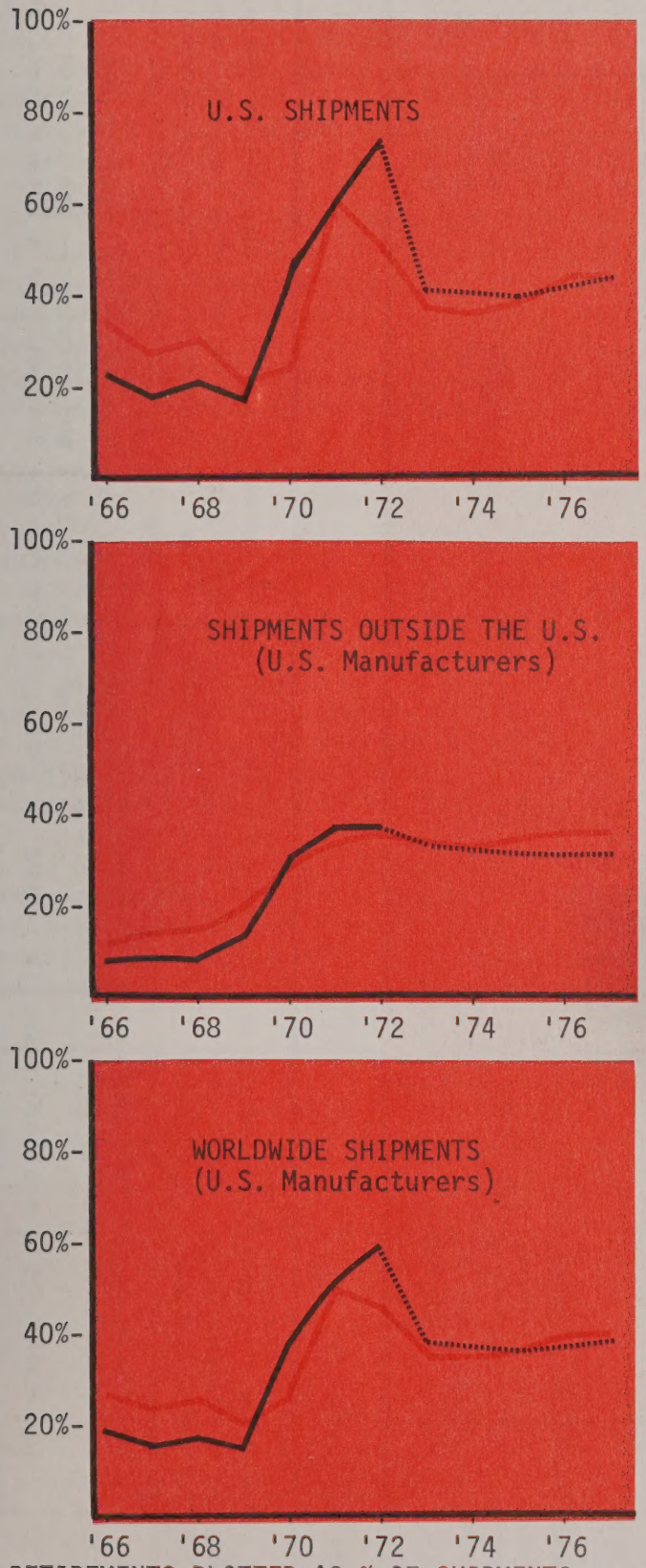
MASSIVE RETIREMENT CYCLE DECLINING AS SHIPMENTS APPROACH A 'NORMAL' MIXTURE



RETIREMENTS PLOTTED AS % OF SHIPMENTS; GOOD SIGN FOR OUTLOOK OF RENTAL YIELDS

"DISCONTINUANCES" was the IBM word when equipment "retirements" leaped up to the 60% level in the U.S. -- nearly 50% when measured on a world-wide basis -- back in 1971 (graphs).

Whatever you call it, it spells trouble in a rental industry. In simplest terms, the phenomena means that equipment is manufactured, then shipped to users simply to replace an item that is already producing revenue for the manufacturer.

As a result, the cost of manufacturing is NOT offset by additional rentals. The customer benefits, but the manufacturer doesn't add nearly so much new revenue producing capacity for his expended buck. And in massive doses, it hurts.

In the U.S., this 1971/1972 occurrence is blamed on several things. Most important: users gaining additional capacity from new technology without increasing rental payments or doing more for less, through consolidation, sending equipment back to computer manufacturers or other suppliers involved.

Outside the U.S., computer users always seemed to pace progress more carefully and listen to less oversell; they didn't produce nearly the retirement hump seen in the U.S. during 1971 and 1972.

In any event, things seem to have begun to straighten themselves out, and retirements -- as the graphs indicate -- should hold in the range of 35% to 40% of shipments during the next five years . . . increasing a bit as the late 1970s and another computer generation update cycle begins.

By the time this "last generation" of computers arrives, however, the effect won't be nearly so noticeable or hurt so much . . . thanks both to a vastly larger base and smarter users.

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TABLE I -- TOTAL WORLDWIDE REVENUE
ESTIMATED & PROJECTED REVENUE TO AMERICAN-BASED COMPANIES FROM KEY SECTORS OF THE EDP INDUSTRY
($ Millions)

	General Purpose Computers	Dedicated Application Computers+	Independent Peripheral Equipment*	Data Processing Supplies=	Batch and On-Line Services	Contract & Packaged Software	Total
1962	1,210	35	130	530	220		2,125
1963	1,760	60	145	595	265	5	2,830
1964	2,250	75	170	630	295	20	3,440
1965	2,700	90	175	660	355	50	4,030
1966	3,735	110	185	725	425	100	5,280
1967	4,895	175	225	805	530	175	6,805
1968	6,910	240	315	895	715	270	9,345
1969	7,145	355	405	995	940	355	10,195
1970	7,645	375	525	1,020	1,265	440	11,270
1971	8,355	360	665	1,075	1,495	450	12,400
1972	9,740	560	780	1,180	1,795	410	14,465
1973	11,200	750	965	1,300	2,140	485	16,840
1974	12,760	970	1,145	1,420	2,525	560	19,380
1975	14,490	1,210	1,330	1,550	2,980	650	22,210
1976	16,370	1,450	1,530	1,680	3,500	750	25,280
1977	18,400	1,700	1,750	1,830	4,100	860	28,640
1973-1977 Growth	1.9	3.0	2.2	1.6	2.3	2.1	1.98

+ In the past, virtually all dedicated application computers were purchased by the user. In 1972, IBM began volume shipments of its System/7, offered on a rental basis. Later this year, IDC will survey users to establish acquisition patterns; for now, however, all shipments are counted as revenues

* Some independent peripheral equipment is rented by the manufacturer, but most is supplied at OEM prices to other manufacturers or third-party leasing companies for rental. Thus, shipments are counted as revenues and OEM sales to computer systems manufacturers are excluded

= Some disk packs are sold, others rented. Shipments -- 10% of total in 1972 and growing -- are counted as revenues. Packs for the 3340 will be a future question

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On the legal front, also, IBM has fared well during the last 12 months. In July (EDP/IR July 13, 1972) the Phoenix Federal Court threw out Greyhound Computer Corp.'s case against IBM before even hearing IBM's defense. "Size alone does not constitute an offense," the judge said, adding that IBM's lease and purchase pricing activity during the late 1960s was "brought about by economic factors over which [it] had no control." The case has been appealed, but no jury had a chance to voice what might have been interpreted as public sentiment.

Early this year (EDP/IR Jan.19,1973), another weight was removed from the shoulders of the Giant as Control Data opted for an out-of-court settlement. It bought IBM's wholly owned subsidiary, Service Bureau Corp., but received an almost offsetting $15 million reimbursement for expenses in a package that has been variously calculated to be worth $100 million to CDC. IBM also promised to stay out of the service business in the U.S. for five years, but got CDC to erase the magnetic tapes on which a comprehensive index to IBM documents was contained.

The Justice Department squawked about the tape erasure . . . and the Federal Court of the Southern District of New York slapped IBM's wrists for insisting on this action . . . but the index is gone. As a result, the Justice antitrust suit against IBM is probably a year or two away at best. Many observers think this is exactly the goal IBM had in mind, and that some settlement -- in the form of a consent decree -- will be worked out before the case can come to trial.

And so the only other significant legal matter facing IBM at the moment is the Telex case involving the pricing of peripheral equipment. It is still scheduled for trial in April, but EDP/IR believes it will be settled or appreciably postponed. This could also be IBM's view, as well, considering the increasingly aggressive stance it is taking in the peripheral area.

So with discontinuances under control, a new line of equipment announced and moving into volume production, and legal matters progressing in what appears to be a "comfortable" manner, IBM looks tough in the marketplace. About the only consolation to competitors is that the cards have been dealt.

STATUS OF WORLDWIDE COMPUTER MARKET FOR U.S.-BASED MANUFACTURERS

	1972 Shipments: $M	% Total	In Use Yearend 1972: $M	% Total	1971-72 % Change
IBM	5,845	65.2	28,475	63.5	+ 6
Plug-Compat.	410	4.6	1,180	2.6	+ 33
HIS	745	8.4	4,470	10.0	+ 14
Univac/RCA	485	5.5	3,415	7.6	+ 7
Burroughs	425	4.8	2,015	4.5	+ 15
CDC	255	2.9	1,870	4.2	+ 15
NCR	215	2.4	1,090	2.4	+ 22
DEC	195	2.2	690	1.5	+ 46
Others (including minis)	300	3.4	1,625	3.7	+ 25
TOTALS	8,875	100.0	44,830	100.0	+ 10

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The other mainframers -- quiet, but successful

As the table on page 5 illustrates, IBM accounted for only 65.2% of mainframe shipments (including minicomputers) last year. As a result, it lost market share . . . some at its "own" sites as independent peripherals were installed, some to the other mainframers. IBM's installed base was up only 6% even though the industry averaged a 10% increase.

In addition, 1972 was one of unusual purchase activity. Users took their 370s early in the delivery cycle as expected, and another $380 million worth of these computers was purchased by third parties for lease to customers. The result was a five percentage point decrease in IBM's U.S. rental base to the 50% level. And even though this condition would probably have "righted" itself with a gradual shift toward rentals, IBM moved boldly to correct or postpone user purchases. The four-year CPU lease plan -- with its 50% purchase credit provision -- will definitely impair purchase, though to what extent is not yet known.

But that's the IBM side of the story. The other major mainframers proved they could be quite successful by staying relatively quiet . . . offering more versions of existing equipment . . . concentrating on profits . . . and waiting to see how IBM moved in the marketplace. Well, profits they made . . . and IBM established quite a few new groundrules (above). Here's a rundown on the remaining "dwarfs" in the computer game.

HONEYWELL INFORMATION SYSTEMS gave proof that the price/performance revision is a successful route. During 1972, it received some 220 orders for its 6000 series computer -- a revised version of the GE 600 line -- and shipped about 100 systems to customers. And it announced its 2000 series, a further revision of the 200 line that was first delivered ten years ago. But these machines are simply attempts to keep salesmen -- and perhaps customers -- happy until a new line can be introduced. That time is approaching.

EDP/IR expects Honeywell to introduce a true new family of computers by summer of this year. And following what seems to have become industry practice, HIS is expected to unveil two or three CPUs in the middle of the line ($5,000-to-$30,000 per month area), waiting a while before either the top of the line (protected by the 6000) is announced or an attack is made in the low-priced marketplace. HIS's strength is in the middle (see chart, page 7) and its first duty is to protect its base.

The new line is expected to be architecturally different from the 200 series, using an IBM-type 8-bit byte rather the 6-bit character from the 200. It will obviously be designed to fill the dual role of competing with the 370 while offering a relatively easy upgrade or migration route for existing Honeywell customers. Extensive use of microprogramming is thus implied.

In the dedicated application area, where it still ranks third in value of shipments, Honeywell introduced its 700 series with very little fanfare. As an outgrowth of the old Computer Control Division design, it is particularly systems and communications oriented. Many show up as controllers or front ends in 2000 and 6000 systems, and the "mini" could be considered a competitor for IBM's System/7 rather than another entry in the traditional mini market (page 9). So once the new line is introduced, HIS will look most like IBM -- in organization as well as product line. That shouldn't really be a shocker to students of the company; for some time it has advertised itself as the "Other Computer Company."

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GENERAL-PURPOSE COMPUTER MARKET -- SHARE BY MANUFACTURER
(% by Number by Price Class, Minicomputers Excluded, U.S. Installations Only)

Price Class	Monthly Rental Range	% Market Share: IBM	HIS	Univac	Burr.	CDC	NCR	Others
Very Small	< 1,250			45.9			54.1	
Small	< 2,500	88.6	1.9	4.5	0.4		2.4	2.2
Small-Medium	< 5,000	56.5	16.7	16.2	-		10.6	
Medium	< 10,000	42.9	11.9	6.5	19.8	1.3	16.4	1.2
Medium-Large	< 20,000	72.9	12.0	5.9	5.1	0.6	0.6	2.9
Large	< 40,000	62.6	7.4	15.3	5.6	3.7	0.6	4.8
Very Large	< 80,000	74.1	3.5	13.0	2.0	6.7		0.7
Extra Large	> 80,000	69.8	13.3	0.2	0.4	16.3		
Total (by number)		66.2	9.3	10.6	3.9	0.9	7.5	1.6
Total (by value)		70.2	8.9	8.5	4.7	3.6	2.5	1.6

UNIVAC's major feat for 1973 was successful management of the RCA user base acquired when the electronics giant dumped its computer operations. Exceeding all expectations from outside the company, Univac not only retained more than 90% of the RCA users as customers (even though some had "escaped" before Univac appeared as their guardian); it also shipped about $100 million worth of additional equipment to these users.

In the product area, Univac was relatively quiet, announcing a single CPU version of its 1110. This machine, in its multiple-processor versions, has been most popular outside the United States. Six of the eight installations at year-end were overseas. Of the two dozen or so currently on order, half are slated for delivery in Japan. Most observers have expected a small, System/3 class computer from Univac, and the delay in its announcement is attributed to the emphasis on financial -- not simply product -- planning within the organization. The EMR-Computer subsidiary of Schlumberger was acquired late in 1972, and this might serve as a base for small business computers plus communications controllers.

BURROUGHS received quite a blow to its prestige -- but little else -- when it "lost" the Barclay Bank account. The equipment had been purchased . . . and it's still there . . . and none of Burroughs' important banking business in the U.S. was contingent on the highly sophisticated system planned in Britain. And on the other side of the status coin, the company shipped the huge Illiac IV to Nasa's Ames Research Center and described the system as "the largest and most powerful computer ever to be constructed." This won't result in much commercial fallout, either, but at least one more system is expected to be ordered.

Futures for Burroughs are tied, to a large extent, to the two product lines introduced during the last year. Both the 1700 and 700 are highly sophisticated from a technical point of view, but almost transparent to the business user for whom they are being marketed. With these machines . . . and its vast library of software packages for business . . . and its large installed base of accounting equipment (EDP/IR Mar.19,1973), Burroughs hopes to penetrate the three lowest price classes shown on the above chart. It's entry level computer business for the company, but it's ripe territory -- partially opened by IBM with System/3,

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partially already in the company's base, much as IBM's punched-card installations for years supplied an entry for the computer salesman.

And though the B 700 was initially announced as an accounting machine type product and pegged in between Burroughs' L series "commercial mini" and the 1700, it is virtually certain to show up in other configurations. Communications capabilities have been promised, and indications are that the 700 will form the heart of a line of "super-smart" remote terminals. The market for such products is vast among the many organizations moving to communications networks for processing.

CONTROL DATA's surprise settlement with IBM is a strong indication that the maker of "the world's largest computers" has decided that services is the route to future success in the computer industry. As a mainframer, its stature isn't the best -- aging product line . . . star designer (Seymour Cray) off doing his own thing . . . Star computer kicked out of General Motors with prospects at best of another Government order or two.

But after being catapulted overnight into the Number One spot in the services industries (EDP/IR Jan.19,1973), and getting a cash infusion from IBM as part of the bargain, CDC's future looks bright. Not much yet has come out of its joint venture (Computer Peripherals) with NCR, but there's a chance for some hot terminals to connect to its Cybernet of large computers. And the relative makeup of the two companies' product lines (page 7) still indicates that much could be gained from closer cooperation.

Meanwhile, CDC is developing its position as a plug compatible peripheral supplier, buying 360/370 add-on memories OEM from Fabritek and AMS to supplement its own disk drive designs. And it is selling computers abroad. Some 50% of CDC's 1972 shipments were outside the U.S.

NATIONAL CASH REGISTER suffered the pains of reorganization in 1972 as it stepped up its conversion from mechanical equipment to electronic terminals. It had layoffs, took a $70 million writeoff, and elected a new president. Otherwise, the company had a fine year.

NCR moved into a second stage with its Century family, introducing price/performance improvements so typical of most other mainframers. The top-of-the-line Century 300 was moving well. Quite obviously, NCR couldn't afford to be without its mainframe computer business.

And the company is making great strides with its automated transaction processing hardware. Efforts in the emerging POS market (EDP/IR Nov.6,1972), for example, were capped earlier this month by a $60 million order from Montgomery Ward. How can you beat "the largest single order ever written with any customer"?

DIGITAL EQUIPMENT CORP. doesn't derive a large portion of its revenues from the general-purpose sector of the computer industry . . . yet. But its shipments approached $200 million in 1972 and EDP/IR feels this qualifies DEC as a "dwarf." The company is still feeling its way in the general-purpose arena, however.

Upon purchasing an RCA memory plant last year, DEC up and cut prices on its DecSystem 10 line. Asked whether the money wouldn't better be used in general-purpose software, a company spokesman replied that DEC charged for that. But it is getting its feet wet . . . and with the PDP-11 series, it has a family that runs the gamut from OEM component to medium-scale system. DEC will learn.

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DEDICATED APPLICATION COMPUTER SHIPMENTS UP OVER 50% IN 1972; AVERAGE SYSTEM VALUE HOLDING IN $30K RANGE DESPITE PLUNGE IN OEM PRICES

All the elements for a booming market combined in 1972 to push shipments of dedicated application computers -- mostly minis -- up 55% to the $560 million level and set the pace for continued rapid growth during the next few years:

- Pent-up user demand was unleashed as budgets loosened and the Phase II investment tax credits could apply;
- IBM began volume shipments of its System/7, broadening the market base rather than increasing competition for the same dollars;
- OEM manufacturers and systems houses further broadened the demand for minis as these sophisticated function boxes began to show up in terminals, machine tools, and small business systems.

As a result of all the factors at work, the "average" value of all dedicated application computers shipped remained about the same as in 1971 -- around $30,000 -- and is expected to maintain this level for the next few years. The many offsetting influences in the marketplace are illustrated by the following:

WORLDWIDE SHIPMENTS OF DEDICATED APPLICATION COMPUTERS -- 1972

Price Class	Typical System	No.CPUs	% Total	Avg.$K	Value ($M)	% Total
Less than $25K	Nova;PDP-8/E	9,400	50.0	14	133	23.8
$25 to $50K	PDP 8/I,11/20	7,940	42.2	35	278	49.6
$50 to $100K	IBM System/7	1,200	6.4	75	90	16.1
Over $100K	SEL; GE/PAC	260	1.4	225	59	10.5
TOTALS		18,800	100.0	30	560	100.0

For a large minicomputer supplier, such as Digital Equipment, the same factors influence the shipment mix; thus, market share tends to be the same whether measured on a numbers or dollars basis. Results of other companies, however, reflect current product offerings (Microdata and IBM, below, illustrate extremes). Here's a company breakdown of 1972 dedicated application computer shipments:

Company	# Units	% Total	$M Value	% Total
Digital Equipment	5,550	29.5	174	31.1
IBM	1,275	6.8	70	12.5
HIS	700	3.7	60	10.7
Hewlett Packard	1,335	7.1	45	8.0
Data General	2,070	11.0	30	5.4
Varian	965	5.1	17	3.0
General Automation	800	4.3	16	2.9
Systems Eng. Labs	105	0.6	16	2.9
GE/PAC	115	0.6	15	2.7
Interdata	535	2.9	13	2.3
Computer Automation	700	3.7	8	1.4
Microdata	1,400	7.4	7	1.3
Others	3,250	17.3	89	15.8
TOTALS	18,800	100.0	560	100.0

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And minicomputer shipment growth doesn't stop with a banner 1972. As the IDC estimates (page 14) detail, 1972 simply made up for 1971's relatively poor 13% growth. Without the recession, each of these years probably would have shown growth rates in the 40+% area.

Why the growth? See above. The traditional mini suppliers offer "bare bone" boxes that bring computing power for only a few thousand dollars. Some observers think the microcomputer, the proverbial "computer-on-a-chip," will replace large portions of this market, especially as components in terminals. But the software and support available with small minis will keep their applications growing for quite some time. Texas Instruments, as if to cover all bets, is going both ways.

And other factors are at work. IBM sees its "mini" -- System/7 -- as part of a system . . . tying the real world to sensors to host 360s or 370s. Its product is sold on a systems basis, usually to large DP users, and therefore hasn't made inroads into the traditional minicomputer marketplace.

Finally, there are the third parties -- usually systems houses of some sort -- that know some business or industrial application and how to computerize it. These companies concentrate on the application, design appropriate software, and usually by the time the system is sold the hardware is incidental (EDP/IR Mar.7, 1973). So these customers will likely stick with products they know. At any rate, the indicated demand for dedicated application computers is high enough to suggest this will be the fastest growing industry segment during the next five years (page 4). Before that period is over, however, the character of the marketplace will probably undergo vast change.

PLUG COMPATIBLE PROSPECTS 'GOOD,' BUT ARMONK CONTINUES TO TURN THE SCREW

Depending on his orientation, an observer could term the independent plug-to-plug compatible peripheral equipment manufacturers "parasites" . . . "saviours" . . . or almost anything in between. In any event, to retain their status these companies must continue to offer products that 1) are at least functionally transparent to IBM users and computers and, 2) are priced to sell for less than their IBM equivalents. This means product planning is done in Armonk, but specifications aren't released until the equipment is delivered to customers . . . and manufacturing techniques remain a deep, dark secret.

As a result, these companies tend to have a shorter product marketing and manufacturing life (two-to-three years versus four or more for IBM) and in most cases must compensate for lower price by some technique other than manufacturing economies of scale.

In the face of these odds, the plug compatibles as a group have done fairly well. U.S. shipments (about 80% the total) in 1972 were:

	No. of Units	$ Millions
360/370 Main Memory	NA	138
3420 Compatible Tape Drives	3,500	86
3330 Compatible Disk Drives	400	18
2314/2319 Compatible Disk Drives (incl. double density)	2,000	69
1403 Compatible Printers	300	16
TOTALS	6,200	327

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IBM, it seems, is out to make things as difficult as possible for the plug-compatible suppliers. As the preceding table indicates, tape drive manufacturers -- primarily Storage Technology -- were able to move rapidly since the technology until just recently, at least, hasn't been a great deterent. In the disk drive area, things have been tougher. Many independents tried (with moderate success) to wait out the catch-up time for a 3330 equivalent with a double-density version of the 2314. And now that 3330s are about ready to move, IBM has dropped the long rumored Winchester, or 3340 into the picture (EDP/IR Mar.19,1973).

On all these products, the independents must cope with IBM's extended term lease plan -- essentially replacing rent as the standard acquisition method on new peripherals -- that locks out much of the market for two years.

And the memory suppliers aren't getting away unscathed, as events of the last couple of weeks would indicate. Not only does IBM offer highly advanced semiconductor memory; it also seems to be out for a four-year lock via its new no-overtime-charge term lease plan for CPUs. And just last week, it announced a new "inspection charge" for customers with independent memory.

In spite of all this, the outlook for plug-compatible peripheral manufacturers isn't all that bad. Computer users have become more sophisticated, more cost conscious, less tied to old IBM commitments. As a result, IDC sees shipments in the plug-compatible sector increasing some 15% to 20% during 1973 and another 10% to 15% in 1974. There may be a "netting" problem as older products are retired before their expected payout, but the user base probably provides enough demand. IBM has been scrapping 2311s for years, and already seems to be retiring rented 2314s that are upgraded to 3330s.

TELEPROCESSING MEANS GROWTH FOR TERMINALS AND SERVICES ALIKE

Two portions of the computer marketplace are in for fantastic growth during the next several years, yet neither of them stand out in EDP/IR's basic sector forecasts (page 4). They are each part of an area that itself undergoes the tranquility effect discussed earlier. Both are tied to telecommunications; neither is dominated by IBM:

- Terminals of all kinds -- teletypewriter, remote batch; dumb, smart; general purpose, application unique -- will have shipment growth of 20% or so a year. And the U.S. installed base of all terminals will grow even faster -- from $2.8 billion now to over $4 billion by 1974.

- Services, in total, will also grow at rates approaching 20% -- from $1.8 billion in 1972 to the $2.5 billion level by 1974. And the remote services subsector of this market will have growth rates in the 30% range (EDP/IR Sept.15,1972).

The reasons are simple. Communications is the wave of the future in information processing. It's where users are headed . . . inescapably! IDC interviews with large using organizations indicate that many are in the first phases of five- and ten-year development cycles aimed at implementing communications-oriented processing systems. In addition, services are being created to handle specific types of transactions . . . products to implement them. The future of this developing industry is so encouraging that IDC in April will begin publishing a newsletter -- AUTOTRANSACTION Industry Report -- to track it. Reader inputs and inquiries are invited.

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TABLE II

WORLDWIDE COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
		TOTAL		
1966	12,100	45,300	$ 3,900	$ 15.9
1967	17,320	61,230	5,460	20.4
1968	17,300	75,785	6,955	26.3
1969	20,300	92,225	7,389	32.6
1970	23,020	111,490	7,145	37.0
1971	28,540	134,310	7,165	40.8
1972	37,350	160,645	$ 8,875	$ 44.8
1973	48,610	199,845	9,900	51.2
1974	58,070	247,945	10,770	58.2
1975	69,435	306,815	11,710	66.1
1976	82,665	376,375	13,050	74.7
1977	96,560	456,595	14,100	84.1
		GENERAL-PURPOSE COMPUTERS (GROUP A)		
1966	10,600	40,100	$ 3,790	$ 15.2
1967	14,570	53,330	5,285	19.6
1968	12,800	63,385	6,715	25.2
1969	12,200	71,925	7,032	31.2
1970	11,820	79,490	6,768	35.3
1971	16,330	90,485	6,805	38.7
1972	18,550	98,520	$ 8,315	$ 42.1
1973	23,610	113,320	9,150	47.8
1974	25,570	129,820	9,800	53.9
1975	27,710	148,140	10,500	60.7
1976	30,880	168,380	11,600	68.0
1977	33,600	190,630	12,400	75.9
		DEDICATED-APPLICATION COMPUTERS (GROUP B)		
1966	1,500	5,200	$ 110	$ 0.7
1967	2,750	7,900	175	0.8
1968	4,500	12,400	240	1.1
1969	8,100	20,300	357	1.4
1970	11,200	32,000	377	1.7
1971	12,210	43,825	360	2.1
1972	18,800	62,125	$ 560	$ 2.7
1973	25,000	86,525	750	3.4
1974	32,500	118,125	970	4.3
1975	41,725	158,675	1,210	5.4
1976	51,785	207,895	1,450	6.7
1977	62,960	265,965	1,700	8.2

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TABLE III

GENERAL PURPOSE COMPUTER MARKET (GROUP A)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
		WORLDWIDE		
1966	10,600	40,100	$ 3,790	$ 15.2
1967	14,570	53,330	5,285	19.6
1968	12,800	63,385	6,715	25.2
1969	12,200	71,925	7,032	31.2
1970	11,820	79,490	6,768	35.3
1971	16,330	90,485	6,805	38.7
1972	18,550	98,520	$ 8,315	$ 42.1
1973	23,610	113,320	9,150	47.8
1974	25,570	129,820	9,800	53.9
1975	27,710	148,140	10,500	60.7
1976	30,880	168,380	11,600	68.0
1977	33,600	190,630	12,400	75.9
		UNITED STATES		
1966	7,600	27,100	$ 2,760	$ 10.7
1967	9,670	35,800	3,810	13.8
1968	7,400	41,000	4,645	17.5
1969	6,600	45,700	4,642	21.4
1970	5,040	48,450	4,073	23.6
1971	8,560	54,470	3,975	25.2
1972	10,970	57,730	5,170	26.6
1973	13,030	65,440	5,430	29.8
1974	13,570	73,780	5,700	33.2
1975	14,250	82,810	5,990	36.9
1976	15,670	92,550	6,600	40.7
1977	16,460	102,970	6,900	44.8
		INTERNATIONAL		
1966	3,000	13,000	$ 1,030	$ 4.5
1967	4,900	17,530	1,475	5.8
1968	5,400	22,385	2,070	7.7
1969	5,600	26,225	2,390	9.8
1970	6,780	31,040	2,695	11.7
1971	7,770	36,015	2,830	13.5
1972	7,580	40,790	$ 3,145	$ 15.5
1973	10,580	47,880	3,720	18.0
1974	12,000	56,040	4,100	20.7
1975	13,460	65,330	4,510	23.8
1976	15,210	75,830	5,000	27.3
1977	17,140	87,660	5,500	31.1

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TABLE IV

DEDICATED APPLICATION COMPUTER MARKET (GROUP B)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Million Value In Use
		WORLDWIDE		
1966	1,500	5,200	$ 110	$ 660
1967	2,750	7,900	175	825
1968	4,500	12,400	240	1,050
1969	8,100	20,300	357	1,380
1970	11,200	32,000	377	1,720
1971	12,210	43,825	360	2,105
1972	18,800	62,125	$ 560	$ 2,690
1973	25,000	86,525	750	3,390
1974	32,500	118,125	970	4,285
1975	41,725	158,675	1,210	5,395
1976	51,785	207,895	1,450	6,715
1977	62,960	265,965	1,700	8,245
		UNITED STATES		
1966	1,000	4,000	$ 75	$ 565
1967	2,000	6,000	130	690
1968	3,500	9,500	185	865
1969	6,700	16,100	277	1,135
1970	8,900	25,560	282	1,385
1971	9,350	34,615	245	1,663
1972	15,100	49,345	$ 410	$ 2,107
1973	19,470	68,385	540	2,610
1974	24,600	92,375	700	3,255
1975	31,425	123,150	865	4,045
1976	38,185	159,425	1,020	4,970
1977	45,100	200,525	1,175	6,020
		INTERNATIONAL		
1966	500	1,200	$ 35	$ 95
1967	750	1,900	45	135
1968	1,000	2,900	55	185
1969	1,400	4,200	80	245
1970	2,300	6,440	95	335
1971	2,860	9,210	115	442
1972	3,700	12,780	$ 150	$ 583
1973	5,530	18,140	210	780
1974	7,900	25,750	270	1,030
1975	10,300	35,525	345	1,350
1976	13,600	48,470	430	1,745
1977	17,860	65,440	525	2,225

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General Purpose Digital Computer (Group A) Census, shown below, are based on the best information available to the International Data Corporation, but are estimates. Computer manufacturers, as a rule, do not directly supply this type of information, and it is only through the use of IDC's extensive data files and other information sources that such estimates are possible. The computers included in Group A comprise the bulk of digital computers (by value) in operation. They are byte or character oriented -- with the exception of large-scale scientific machines -- and are primarily programmed with higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and specialized-purpose machines.

AS OF JANUARY 1, 1973

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	B-100 Series	$ 3,300	8/64	6	-	6	X
	B-200 Series	$ 5,600	11/61	130	83	213	X
	B-300 Series	$ 5,200	7/65	460	70	530	X
	B-500	$ 6,000	11/68	475	450	925	X
	B-1712	$ 1,950	8/72	50	0	50	NA
	B-1714	$ 2,200	8/72	30	0	30	NA
	B-1716	$ 5,300	2/73	-	-	-	NA
	B-2500	$ 8,200	2/67	275	125	400	X
	B-2700	$ 8,700	8/72	17	13	30	75
	B-3500	$ 14,700	5/67	565	340	905	X
	B-3700	$ 21,000	11/72	10	0	10	80
	B-45/4700	$ 28,000	10/71	70	29	99	50
	B-5500	$ 35,000	3/63	105	35	140	X
	B-5700	$ 28,500	12/70	20	5	25	10
	B-65/6700	$ 50,000	11/69	45	40	85	15
	B-7700	$120,000	2/72	2	0	2	5
	Subtotal			2,260	1,190	3,450	235
Control Data Corp.	G-20	$ 19,600	4/61	3	6	9	X
	1604/A/B	$ 42,000	1/60	18	4	22	X
	31/3150	$ 9,000	12/64	91	43	134	X
	3170	$ 17,500	12/70	14	8	22	X
	3200	$ 14,700	5/64	57	43	100	X
	3300	$ 28,800	9/65	110	95	205	X
	3400	$ 23,700	11/64	6	9	15	X
	3500	$ 26,000	1/69	10	15	25	3
	3600	$ 48,000	6/63	20	16	36	X
	3800	$ 53,000	12/65	27	3	30	X
	6200	$ 39,000	11/70	2	7	9	X
	Cyber-72	$ 32,900	10/71	7	14	21	9
	6400	$ 54,000	5/66	60	46	106	X
	Cyber-73	$ 47,000	3/72	6	14	20	12
	6500	$ 68,000	12/67	17	9	26	2
	6600	$115,000	8/64	59	33	92	X
	Cyber-74	$105,000	3/72	2	6	8	6
	6700	$125,000	7/70	2	1	3	X
	7600	$165,000	1/69	10	4	14	X
	Cyber-76	$165,000	3/72	1	0	1	3
	Star-100	$250,000	8/73	-	-	-	1
	Subtotal			522	376	898	36
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	16	9	25	X
	1040/1050	$ 13,300	10/67-12/71	160	67	227	13
	1055	$ 22,000	12/71	20	5	25	18
	1070/1077	$ 30,000	6/72- 9/72	3	0	3	5
	Subtotal			199	81	280	36
Friden	System 10	$ 2,500	10/70	340	160	500	400
Honeywell Information Systems	Gamma 10	$ 2,500	7/64	0	1,020	1,020	X
	G-5X Series	$ 1,550	1/66	320	2,300	2,620	300
	G-100 Series	$ 4,000	4/66	385	1,740	2,125	X
	G-200 Series	$ 13,700	4/61	225	54	279	X
	G-405/410	$ 9,000	2/68	20	7	27	X
	G-415/420	$ 14,000	5/64	168	200	368	X
	G-425/430	$ 17,000	6/64	68	100	168	X
	G-435/440	$ 22,000	9/65	60	40	100	6
	G-615	$ 55,000	6/69	11	22	33	X
	G-625	$ 65,000	4/65	2	3	5	X
	G-635	$ 80,000	5/65	58	13	71	X
	G-645	$120,000	7/66	3	1	4	X
	G-6030/6040	$ 33,000	6/71	33	35	68	68
	G-6050/6060	$ 46,500	7/71	24	15	39	25
	G-6070/6080	$ 61,500	7/71	6	4	10	7
	G-6180	$100,000	2/74	-	-	-	NA
	G-Subtotal			1,383	5,554	6,937	406
	H-105	$ 2,500	11/71	350	90	440	180
	H-110	$ 2,600	9/68	215	170	385	X
	H-115	$ 5,300	3/70	1,025	300	1,325	230
	H-120	$ 4,600	1/66	580	210	790	X
	H-125	$ 7,900	12/67	125	325	450	X
	H-200	$ 6,400	3/64	575	275	850	X
	H-2020	$ 2,350	2/73	-	-	-	NA
	H-2030	$ 5,050	1/73	-	-	-	NA
	H-2040	$ 9,000	4/72	96	32	128	95
	H-1015	$ 12,500	4/71	100	45	145	40
	H-2050	$ 14,100	4/72	54	21	75	55
	H-12/1250	$ 12,000	2/66	380	170	550	X
	H-2015	$ 17,800	2/71	130	40	170	30
	H-2060	$ 18,500	4/72	20	5	25	25
	H-2200	$ 19,600	1/66	135	62	197	X
	H-2070	$ 23,000	5/72	22	3	25	17
	H-3200	$ 26,900	2/70	72	34	106	9
	H-4200	$ 31,000	9/68	39	5	44	3
	H-2088	$ 44,000	4/72	5	1	6	6
	H-8200	$ 73,000	2/69	22	4	26	2
	H-4/1400	$ 13,200	12/61	40	24	64	X
	H-800	$ 28,500	12/60	44	11	55	X
	H-1800	$ 46,000	7/64	7	3	10	X
	H-Subtotal			4,036	1,830	5,866	692
	HIS-Subtotal			5,419	7,384	12,803	1,098

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AS OF JANUARY 1, 1973

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
IBM	System 3/6	$ 1,530	12/70	1,800	1,300	3,100	1,000
	System 3/10	$ 2,200	1/70	8,700	4,200	12,900	2,900
	360/20	$ 3,700	12/65	6,500	5,250	11,750	X
	360/22	$ 5,800	7/71	1,120	265	1,385	350
	360/25	$ 7,500	10/68	1,750	1,250	3,000	X
	370/125	$ 9,800	4/73	-	-	-	2,900
	360/30	$ 11,000	6/65	4,300	2,950	7,250	X
	370/135	$ 13,500	5/72	970	405	1,375	2,600
	360/40	$ 19,600	6/65	2,550	2,050	4,600	X
	370/145	$ 24,700	7/71	1,270	565	1,835	1,100
	360/44	$ 14,300	7/66	85	85	170	X
	360/50	$ 32,100	8/65	870	640	1,510	X
	370/155	$ 51,700	2/71	1,045	435	1,480	660
	370/158	$ 59,200	4/73	-	-	-	inc
	360/65	$ 69,000	11/65	460	230	690	X
	370/165	$ 89,800	6/71	195	54	249	180
	370/168	$115,500	7/73	-	-	-	inc
	360/67	$112,000	6/66	53	10	63	X
	360/75	$ 94,000	1/66	31	19	50	X
	360/85	$141,000	10/69	7	6	13	X
	360/9X	$150,000	11/67	13	3	16	X
	360/195	$188,000	3/71	16	4	20	]
	370/195	$192,000	5/73	-	-	-	] 14
	1130	$ 2,300	2/66	3,900	2,100	6,000	X
	305	$ 3,600	12/57	1	1	2	X
	1401	$ 3,700	9/60	1,350	1,500	2,850	X
	1401-G	$ 2,300	5/64	130	70	200	X
	1401-H	$ 1,300	6/67	100	50	150	X
	1410	$ 17,000	11/61	115	62	177	X
	1440	$ 4,700	4/63	400	390	790	X
	1460	$ 9,800	10/63	65	47	112	X
	1620	$ 2,700	9/60	390	255	645	X
	7010	$ 26,000	10/63	14	9	23	X
	7030	$160,000	5/61	4	1	5	X
	704	$ 32,000	12/55	1	1	2	X
	7040	$ 25,000	6/63	12	19	31	X
	7044	$ 36,500	6/63	9	14	23	X
	705	$ 38,000	1/56	5	3	8	X
	7070-74	$ 27,000	3/60	113	40	153	X
	7080	$ 60,000	8/61	51	1	52	X
	7090	$ 63,500	8/60	21	11	32	X
	7094	$ 73,400	9/62	57	6	63	X
	7094-II	$ 79,400	4/64	9	1	10	X
	Subtotal			38,482	24,302	62,784	11,704
NCR	Century-50	$ 1,950	2/71	600	0	600	165
	Century-100	$ 2,980	9/68	1,170	780	1,950	]
	Century-101	$ 2,750	10/72	50	0	50	] 150
	Century-200	$ 7,900	9/69	580	330	910	130
	Century-251	$ 10,000	11/73	-	-	-	NA
	Century-300	$ 20,000	2/72	5	5	10	35
	304	$ 10,000	1/60	10	1	11	X
	310	$ 1,000	5/61	24	9	33	X
	315	$ 5,000	5/62	365	375	740	X
	315-RMC	$ 11,800	9/65	56	52	108	X
	390	$ 800	5/61	250	190	440	X
	500	$ 1,100	10/65	875	1,690	2,565	X
	Subtotal			3,985	3,432	7,417	480
Philco	1000	$ 7,000	6/63	15	1	16	X
	210/211	$ 40,000	10/58	11	1	12	X
	212	$ 52,000	1/63	7	0	7	X
Standard Computer Corp.	IC-4000	$ 9,000	9/68	5	0	5	X
	IC-6000	$ 16,000	5/67	3	0	3	X
	IC-7000	$ 17,000	6/69	7	0	7	X
Univac	I/II	$ 25,000	3/51	4	4	8	X
	III	$ 25,400	8/62	41	39	80	X
	SS-80/90	$ 8,000	8/58	30	30	60	X
	418-I/II	$ 13,700	6/63	]	]	]	X
	418-III	$ 19,600	7/69	] 128	] 130	] 258	15
	491/492	$ 27,000	12/61	17	13	30	X
	494	$ 41,400	2/66	51	38	89	X
	1004	$ 1,000	2/63	975	1,000	1,975	X
	1005	$ 1,630	4/66	750	170	920	X
	1050	$ 8,800	9/63	210	140	350	X
	1103/5	$ 35,000	12/50	0	2	2	X
	1106	$ 40,000	12/69	46	63	109	20
	1107	$ 57,000	10/62	10	13	23	X
	1108	$ 68,000	9/65	140	92	232	5
	1110	$ 79,000	6/72	2	6	8	25
	9200	$ 2,300	6/67	1,550	900	2,450	100
	9300	$ 4,050	9/67	850	870	1,720	60
	9400	$ 11,600	5/69	220	225	445	60
	9700	$ 21,000	8/72	8	4	12	30
	LARC	$135,000	5/60	1	0	1	X
	Subtotal			5,033	3,739	8,772	315
	301	$ 6,600	10/60	205	12	217	X
	501	$ 16,100	6/59	28	1	29	X
	601	$ 40,900	11/62	2	0	2	X
	3301	$ 22,700	7/64	68	0	68	X
	Spectra 70/15	$ 4,000	9/65	17	0	17	X
	Spectra 70/25	$ 7,000	9/65	2	0	2	X
	Spectra 70/35	$ 11,800	1/67	135	5	140	X
	Spectra 70/45	$ 22,600	11/65	310	21	331	X
	Spectra 70/46	$ 37,400	11/68	49	1	50	X
	Spectra 70/55	$ 34,900	11/68	10	2	12	X
	Spectra 70/60	$ 40,500	9/70	20	0	20	X
	Spectra 70/61	$ 47,200	3/71	18	0	18	X
	Spectra 1600	$ 3,600	1/69	63	0	63	10
	Series 70/2	$ 11,500	7/71	130	0	130	40
	Series 70/3	$ 18,900	10/71	11	0	11	0
	Series 70/6	$ 29,300	10/71	40	0	40	15
	Series 70/7	$ 36,300	10/71	14	0	14	6
	Subtotal			1,122	42	1,164	71
	Total			6,155	3,781	9,936	386
Xerox	Sigma-5	$ 11,500	8/67	115	35	150	10
	Sigma-6	$ 20,000	11/70	20	4	24	5
	Sigma-6E	$ 6,100					
	Sigma-7	$ 24,000	12/66	75	25	100	X
	Sigma-8	$ 19,000	9/71	5	2	7	3
	Sigma-9	$ 44,000	11/71	7	6	13	6
	940	$ 24,000	4/66	65	3	68	X
	9300	$ 8,500	11/64	35	6	41	X
	Subtotal			322	81	403	24
	TOTALS			57,732	40,789	98,521	14,399

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MARCH 30,1972 • VOL.7,NO.10 P.J.McGOVERN,EDITOR

Coming of age

SHIPMENTS TURN UPWARD AS NEW INDUSTRY GROWTH PATTERN EMERGES

After several pretty "flat" years, a spark of life re-entered the computer industry during late 1971. And it looks like a harbinger of things to come. Mainframe shipments will be up over 20% this year and another 17% or 18% in 1973 before settling down to the "comfortable" 13% level for the mid-1970 period.

The business mix will be much like old times: Hardware in the forefront; mainframes setting the pace; the U.S. pacing the world. About the only change from the mid-1960 upsurge is that much of the hardware will be communications oriented as the country steadily prepares for an era of distributed processing.

During the past several months, the International Data Corporation has been surveying users, talking with manufacturers, and generally attempting to measure near-term demand for computer hardware. The results, presented in this Review and Forecast issue of EDP Industry Report, are most encouraging. Some highlights of IDC's studies are as follows:

- Shipments of computer hardware -- including mainframes, minicomputers, and plug-compatible peripheral equipment -- reached $7.6 billion in 1971, a new high.

- In the U.S. this year (1972), general purpose computer shipments will zoom 30% to $5.3 billion, breaking the previous high level set in 1968. IBM will be the principal beneficiary as worldwide shipments head for the $9 billion level.

- During the next five years, sparked by the 1972 performance, worldwide shipments by U.S. manufacturers will more than double, rising to the $16 billion level by 1976.

- During the same five-year period, worldwide revenues to U.S.-based companies in the computer industry will grow similarly -- from the $12.5 billion level hit in 1971 to $27 billion in 1976.

- Even so, the fastest growing segment of the computer industry during the first half of the 1970s will be on-line services, conservatively forecast to go from $330 million in 1971 to nearly $2 billion by 1976.

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All in all, it looks as if the doldrums have ended and the computer industry has prospects for a new growth cycle. During the last three years, the end of one product marketing cycle hit smack in the middle of a recession; then, customers were offered much more bang for few if any more bucks. But by early 1972, increased business activity has absorbed most of the oversell of the 1960s; extreme cost-cutting pressure is abating; and new applications need implementing. There's now room for growth as the information processing industry comes of age.

A year of modest accomplishment

The economic recession turned out to be more severe and have considerably more effect on the computer industry than EDP/IR realized at this time last year (EDP/IR Mar.12,1971). Indeed, when looking back at previous industry forecasts and comparing them with what is now expected (page 10), we get the feeling that somehow just about a whole year has been yanked out of the series.

But 1971 ended on an upbeat, with shipments up 7% to the highest level ever. In the U.S., however, a large portion of the equipment shipped to customers was for "modernization," to use capital goods terms. EDP/IR estimates that $1.85 billion of computers -- some 45% of 1971 shipments -- were retired in the U.S. last year. This will drop to less than $1.5 billion in 1972, however, and over the next five years something less than half today's $24 billion domestic base will be retired. Thus, after 1972, retirements are expected to run about 30% of new equipment shipments.

It was IBM's heavy System/370 shipments, replacing older computers, that accounted for most of 1971's increase, in fact. The other manufacturers, taken as a group, were up only 2% last year, and only one major mainframer -- Burroughs -- exceeded the industry average with a 12% increase. In the table (below) that shows how the major companies did during 1971, the plug-compatible independent equipment manufacturers have been included since collectively they represent as large a force as the other mainframers. The value of their equipment is calculated at the list price for the IBM equipment which it replaces.

STATUS OF WORLDWIDE COMPUTER MARKET FOR U.S.-BASED MANUFACTURERS

	1971 Shipments: $M	% Total	1970-71 % Change	In Use Yearend 1971: $M	% Total
IBM	4,711	61.6	+ 8	28,730	67.2
Plug-Compat.	369	4.8	+31	769	1.8
HIS	618	8.1	+ 1	3,902	9.1
Univac	474	6.2	+ 2	2,311	5.4
RCA	233	3.1	-12	948	2.2
Burroughs	434	5.7	+12	1,838	4.3
NCR	293	3.8	+ 3	875	2.1
CDC	193	2.5	- 7	1,588	3.7
DEC	120	1.6	+18	539	1.3
XDS	54	0.7	-13	440	1.0
Others	144	1.9	+40	791	1.9
TOTALS	7,643	100.0	+ 7	42,731	100.0

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The big shocker in computeryear 1971, of course, was RCA's withdrawal from the mainframe business (EDP/IR Sept.29,1971) and the subsequent purchase of its North American installed base by Univac. Because of this, the RCA figures on page 2 are shown adjacent to those for Univac and they will be combined from now on. The news of RCA's demise caused an initial round of shock waves through much of the computer industry. Things have quieted down quite quickly, however, and we continue to believe that RCA's withdrawal was simply that, not an evil omen of things to come.

The biggest story of 1971 was IBM's price cut and fixed-term lease announcement (EDP/IR June 2 & Aug.31,1971). With this one bold move, IBM underscored the flexibility and aggressiveness of its marketing policy while tightening the lock on its customer base and checking the almost rampant "intrusion" that was being made by the independent peripheral manufacturers. Also, in light of the recent extended term pricing plan (EDP/IR Mar.3, 1971), this announcement may have signaled IBM's acceptance of longer-term leasing for the computer industry.

Otherwise, 1971 was considered by many a good year to be past. Events forced industry managements to tighten their belts and pay more attention to reality. As a result, much of the day-to-day mystique and aura of glamor fell away. At the same time, users were forced to reassess their computer operations. In so doing, user management became a little more aware of what computers are all about. Interestingly, this awareness will work well for the computer industry in the years ahead. Backed by management, more and more users will begin implementing new applications that require additional computer equipment and services.

The slope of the curves

The tables on pages 4, 6, 8, and 10 are based on the specific and continuing studies undertaken by the International Data Corporation. They are presented to indicate relative growth rates, market sizes, and the general philosophy behind IDC's projections. Most of the columns of numbers are summaries of detailed studies; they should be examined as such.

The terms used in the first three tables are those normally used by EDP/IR in discussing the computer industry. The most important ones are:

Cumulative value -- The value of the equipment under discussion, calculated at original purchase price.

Shipments -- -- Newly built equipment (excluding that returned, refurbished, and reshipped) valued at original purchase price. The value of shipments include new add-on core and peripherals to existing users.

General-purpose computers (Group A) -- Byte or character oriented computers, plus large word-oriented scientific machines (in IBM nomenclature, all models except 1800 and System/7). Predominately rented.

Dedicated-application computers (Group B) -- Systems which, although general-purpose in processor design, tend to be used for specialized (usually non-business) applications. Predominately purchased. This category includes all minicomputers and medium-priced process control computers. Does not include special aerospace computers, which are not included in any of the data here.

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TABLE I

WORLDWIDE COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
		TOTAL		
1966	11,000	46,200	$ 4,005	$ 15.1
1967	13,850	62,240	5,490	19.7
1968	17,700	75,800	6,815	25.3
1969	21,530	92,870	7,349	31.5
1970	22,810	109,350	7,145	37.6
1971	26,830	132,395	$ 7,643	$ 42.7
1972	36,900	165,300	9,490	49.8
1973	45,400	205,600	11,090	57.9
1974	53,100	248,940	12,560	66.9
1975	63,700	300,700	14,275	76.7
1976	75,250	357,200	16,160	87.5
		GENERAL-PURPOSE COMPUTERS (GROUP A)		
1966	9,500	41,000	$ 3,895	$ 14.4
1967	11,100	53,340	5,315	18.8
1968	13,300	63,400	6,575	24.2
1969	13,430	72,570	6,992	30.1
1970	11,610	78,950	6,768	35.8
1971	15,230	90,695	$ 7,328	$ 40.7
1972	19,900	108,500	9,025	47.4
1973	24,100	129,600	10,550	55.0
1974	28,100	152,440	11,930	63.4
1975	33,000	177,700	13,535	72.7
1976	38,750	204,700	15,300	82.9
		DEDICATED-APPLICATION COMPUTERS (GROUP B)		
1966	1,500	5,200	$ 110	$ 0.7
1967	2,750	7,900	175	0.8
1968	4,500	12,400	240	1.1
1969	8,100	20,300	357	1.4
1970	11,200	30,800	377	1.8
1971	11,600	41,700	$ 315	$ 2.1
1972	17,000	56,800	465	2.5
1973	21,100	76,000	540	2.9
1974	25,000	96,500	630	3.4
1975	30,700	123,000	740	4.0
1976	36,500	152,500	860	4.6

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In general, as the numbers opposite show, IDC expects the installed base of computers made by U.S.-based manufacturers to grow an average of 15% a year over the next five years, in contrast to the 23% annual growth rate (on average) for the preceeding five years. The installed base is the single most important measure of the computer industry:

+ It shows the manufactured value of computers in use, and therefore is a minimum relative measure of computer power, since throughput per dollar costs less each year;

+ Its growth is directly related to revenue growth for companies in the industry, since 60% of all U.S.-made general-purpose computers (by value) are on rental and producing a yearly revenue of about one-fourth their value;

+ Its size determines how shipment growth will affect installed base growth. Thus, the International base will grow somewhat faster (18% vs. 14%) than the U.S. base on similar shipment increases (16%) during the next five years because the starting point is lower.

"OTHER" MAJOR MAINFRAMERS HAVE MIXED PROSPECTS IN IBM SHIPMENT WAVE

The shipment pattern shifted in 1971 as heavy production of IBM System/370 computers began. Rather than outperform IBM in percentage gain as they had during the two prior years, the other mainframers, as a group, had virtually no shipment increase. The results for individual manufacturers, of course, vary widely. And in 1972, the pattern of last year will be repeated, although few if any of the other mainframers have the retirement problem that continues to bother IBM.

The general mainframe picture, and IBM's relation to it, has been reviewed earlier in this issue. The other seven mainframe manufacturers will play second fiddle to IBM again this year. Here is a quick rundown on their prospects.

Honeywell Information Systems spent much effort last year consolidating the merger with General Electric's computer interests. All in all, this has been done effectively: An efficient worldwide operation, with fewer employees, managed to increase shipments slightly despite incompatible product lines. The new 6000 series (EDP/IR Nov.12,1971) has been well accepted and brings a significant contribution to HIS's installed base -- over 20% of some 100 orders are for purchase, and there is relatively little netting problem.

The 2000 series gives HIS a similar price-performance improved computer in the medium-size product category (EDP/IR Feb.8,1972). It should be able to fill HIS's gap until a truly new product line is introduced, and that probably won't be until late 1972, at the earliest. That would mean late 1973 deliveries at the earliest. Shipments during 1972 -- with the 6000 leading the way -- could be up 10% or so to just shy of the $700 million level.

Univac eked out a small shipment increase for 1971, but its most significant activity was the acquisition of RCA's North American base of installed computers. It hopes to keep a large portion of this almost $1 billion base, but EDP/IR expects Univac to retain no more than 40% of the $600+ million rental base over a three-to-five year period. The remainder will return to IBM or be picked off by other mainframers. The 9700, announced during 1971, will be Univac's main offering for the RCA base.

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TABLE II

GENERAL PURPOSE COMPUTER MARKET (GROUP A)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
		WORLDWIDE		
1966	9,500	41,000	$ 3,895	$ 14.4
1967	11,100	53,340	5,315	18.8
1968	13,300	63,400	6,575	24.2
1969	13,430	72,570	6,992	30.1
1970	11,610	78,950	6,768	35.8
1971	15,230	90,695	$ 7,328	$ 40.7
1972	19,900	108,500	9,025	47.4
1973	24,100	129,600	10,550	55.0
1974	28,100	152,440	11,930	63.4
1975	33,000	177,700	13,535	72.7
1976	38,750	204,700	15,300	82.9
		UNITED STATES		
1966	6,500	30,000	$ 2,760	$ 10.2
1967	7,600	35,600	3,815	13.3
1968	9,000	41,400	4,650	17.0
1969	8,450	46,570	4,642	20.8
1970	5,300	48,450	3,948	24.1
1971	8,500	54,470	$ 4,074	$ 26.4
1972	11,400	64,000	5,303	30.3
1973	13,800	75,200	6,220	34.7
1974	15,500	87,940	6,883	39.4
1975	17,600	101,700	7,695	44.7
1976	20,000	115,800	8,550	50.4
		INTERNATIONAL		
1966	3,000	11,000	$ 1,135	$ 4.2
1967	3,500	17,740	1,500	5.5
1968	4,300	22,000	1,925	7.2
1969	4,980	26,000	2,350	9.3
1970	6,310	30,500	2,820	11.7
1971	6,730	36,225	$ 3,254	$ 14.3
1972	8,500	44,500	3,722	17.1
1973	10,300	54,400	4,330	20.3
1974	12,600	64,500	5,047	24.0
1975	15,400	76,000	5,840	28.0
1976	18,750	88,900	6,750	32.5

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The large 1110 experienced additional delays, and deliveries won't start until May. A small computer in the System/3 size class is expected, but neither it nor the large machine offer much chance for shipment gains this year. So unless there's a significant boost from Federal spending, Univac's 1972 shipments will probably be a little below the $474 million chalked up in 1971.

Burroughs solved its 6500 problems last year, and had the best record of any of the major mainframers, with shipments up 12%. And as 1972 progresses, the question is when rather than whether the smaller processors in the Burroughs 700 family will be announced. But they can hardly have much impact on 1972 results.

Burroughs large 6700 computer is going smoothly, but the first-year shipment bulge is past. Another shipment increase of about 10% is expected, but the figure will probably be less than $500 million. Air Force Phase II shipments have about ended, and other purchase business is down; thus, Burroughs did not have a 1971 revenue increase on par with its shipment increase.

NCR is going through the second stage of its current product line cycle. As a result, Century 100 and 200 production is off, but dollar shipments are up somewhat because add-on memory and peripherals are being shipped to existing customers. This trend should continue until the "swing" processor is announced (see below) and it will be hard for 1972 shipments to exceed those of 1971.

Terminals remain a bright spot in NCR's product line, with the retail terminal going very well. Earlier this month the company announced its 399 terminal computer, and this product should help NCR's business the way the TC-500 helped Burroughs.' It contains a specially built minicomputer, and can operate in stand-alone mode or on-line to a larger Century or to an IBM mainframe. This product should help start NCR's smaller accounting machine customers thinking about computers, and will fit in well with the distributed processing concept inherent in NCR's cooperative mainframe project with Control Data (EDP/IR Feb.8,1972).

The name of the jointly owned company announced earlier this year by NCR and CDC is Computer Peripherals, Inc. It will engineer and manufacture punched card equipment, magnetic tape equipment, and high-speed printers for sale only to the two parent companies. Headquarters will be in Edina, Minn.

Control Data had a reasonable increase in computer-related revenue last year even though hardware shipments were off about 7%. More than half its revenues are in various services such as maintenance, software, education, and Cybernet. There are a couple of orders for the company's supergiant Star computer (EDP/IR Nov.12,1971), and some international activity for 6000 (Cyber 70) computers. But EDP/IR expects another shipment drop of 10% to 15% for 1972. Revenues should be up, of course, since the rental base has grown and service is becoming such a large factor in the company's business mix.

Digital Equipment Corp. made quite a to-do about its DECSystem 10 general-purpose computer line last fall (EDP/IR Sept.29,1971), but the great bulk of its business last year was from minicomputers. It was probably the only large manufacturer that benefitted much from the investment tax credit, and its 18% shipment gain of last year should at least be repeated during 1972. The company has undergone considerable reorganization, with more emphasis on marketing, but it remains to be seen whether or not this will result in DEC's coming out with products that will put it into the general-purpose business. Financing a rental base will definitely be a problem if it moves boldly in this direction.

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TABLE III

DEDICATED APPLICATION COMPUTER MARKET (GROUP B)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Million Value In Use
		WORLDWIDE		
1966	1,500	5,200	$ 110	$ 660
1967	2,750	7,900	175	825
1968	4,500	12,400	240	1,050
1969	8,100	20,300	357	1,380
1970	11,200	30,800	377	1,750
1971	11,600	41,700	$ 315	$ 2,055
1972	17,000	56,800	465	2,460
1973	21,100	76,000	540	2,910
1974	25,000	96,500	630	3,400
1975	30,700	123,000	740	4,000
1976	36,500	152,500	860	4,600
		UNITED STATES		
1966	1,000	4,000	$ 75	$ 565
1967	2,000	6,000	125	690
1968	3,500	9,500	180	865
1969	6,700	16,100	277	1,135
1970	9,500	25,000	307	1,425
1971	9,000	33,500	$ 249	$ 1,665
1972	14,000	46,500	377	1,990
1973	16,800	63,000	430	2,350
1974	19,500	80,000	490	2,750
1975	24,000	102,000	570	3,200
1976	28,000	126,000	660	3,650
		INTERNATIONAL		
1966	500	1,200	$ 35	$ 95
1967	750	1,950	50	135
1968	1,000	2,900	60	185
1969	1,400	4,200	80	245
1970	1,700	5,800	70	325
1971	2,600	8,200	66	390
1972	3,000	10,300	88	470
1973	4,300	13,000	110	560
1974	5,500	16,500	140	650
1975	6,700	21,000	170	800
1976	8,500	26,500	200	950

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Xerox continues to lose money on its computer operation, and had another decrease in shipments during 1971. But it has about as much staying power as it choses to exert. With the company's recent reorganization and purchase of little Diablo -- with its ingenious new terminal printer mechanism -- a line of computer terminals might be expected in the not-too-distant future.

HARDWARE SETS THE PACE FOR 19% INDUSTRY REVENUE GROWTH IN 1972

Each of the industry sectors shown in Table IV (page 10) are subjects of specialized study at IDC. And as timing is appropriate, most if not all of them will be the subject of EDP/IR features during the coming year. Each of these industry segments are -- or one day could be -- billion-dollar industries in their own right, and therefore worthy of special study. But to help the reader better understand the accompanying numbers, we present here a brief overview of these key computer industry sectors. As will be noted, many of the sectors are composed of portions that act quite differently -- some lagging and some leading.

Dedicated-application computer shipments were down in 1971 because the product mix is shifting toward pure minicomputers. The IBM 1800s, CDC 1700s, and XDS Sigma 2s and 3s are virtually gone from the new production totals. They accounted for less than 10% of the 1971 shipments (by value).

Despite all the new minicomputer manufacturers, this market is still dominated by Digital Equipment, which had almost 35% of the 1971 shipments, and Honeywell, with over 17%. Among the purely mini manufacturers, Hewlett-Packard was the leader -- with about 10% of shipments by value -- followed by Varian, Data General, General Automation, Interdata, Computer Automation, and a host of others. On a numbers basis, Data General was second only to DEC.

This sector is a nebulous one -- one that we have termed a "non-market" -- and as such is undergoing much change. For the OEM market, there is a trend toward smaller and smaller computers, even sophisticated logic boxes such as the PDP-16 -- not even a computer -- from DEC. At the same time, other companies are concentrating on end-user business, the most popular type at present being the single customer who needs a large number of machines for the same purpose. On the other hand, the single customer who needs a single machine is sort of a rare bird these days, and may have accounted for 10% to 15% of 1971 shipments.

Shipments of dedicated application computers -- mostly minis -- will be up over 50% in the U.S. this year as System/7 deliveries start in volume, capital spending increases, and new Federal funds are provided for education and medical services. New applications -- such as automobile inspection -- should continue to provide a good demand for minicomputers; the five-year increase expected for dedicated application computer shipments is over 22% on a dollar basis. And despite the ads, the average price of a minicomputer will not continue to plummet. Peripherals continue to be expensive, and EDP/IR sees the average price of a minicomputer falling from around the $27,000 level today down to only $23,000 or so for the average system shipped in 1976.

Independent peripheral equipment is broken down by IDC into two separate segments -- IBM plug compatible (including terminals) and off-line. Both sectors grew well during 1971; neither will show much shipment growth in 1972 although some further subsegments -- such as terminals -- will be among the most rapidly growing portions of the industry. This equipment must really be looked at on a product-by-product basis if its activity is to be understood.

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TABLE IV -- TOTAL WORLDWIDE REVENUE
ESTIMATED & PROJECTED REVENUE TO AMERICAN-BASED COMPANIES FROM KEY SECTORS OF THE EDP INDUSTRY
($ Millions)

	General Purpose Computers	Dedicated Application Computers+	Independent Peripheral Equipment*	Data Processing Supplies=	Batch and On-Line Services	Contract & Packaged Software	Total
1961	845	20	110	485	180		1,640
1962	1,210	35	130	530	220		2,125
1963	1,760	60	145	595	265	5	2,830
1964	2,250	75	170	630	295	20	3,440
1965	2,700	90	175	660	355	50	4,030
1966	3,735	110	185	725	425	100	5,280
1967	4,895	175	225	805	530	175	6,805
1968	6,910	240	315	895	715	270	9,345
1969	7,145	355	405	995	940	355	10,195
1970	7,645	375	605	1,020	1,265	440	11,350
1971	8,410	315	785	1,075	1,495	450	12,530
1972	10,240	465	825	1,180	1,825	405	14,940
1973	12,100	540	970	1,280	2,230	480	17,600
1974	14,130	620	1,130	1,380	2,695	560	20,515
1975	16,210	740	1,300	1,490	3,230	650	23,620
1976	18,460	860	1,500	1,610	3,860	750	27,040
1972-1976 Growth	2.2	2.7	1.9	1.5	2.6	1.7	2.16

+ In the past, virtually all Dedicated Application (Group B, page 14) computers were purchased by the user. In 1972, IBM begins volume shipments of its System/7, offered on a rental basis. But until user acquisition patterns are established, EDP/IR has elected to count Group B shipments as revenue.

* Some independent peripheral equipment is rented by the manufacturer, but most is supplied at OEM prices to other manufacturers or third-party leasing companies for renting. Thus, shipments are counted as revenues.

= Some disk packs were rented in the past, but will be sold in the future. Thus shipments -- which were only a small percentage of the total supplies market -- were counted as revenues during the 1967-1971 period.

Briefly, plug-compatible products -- primarily the tape and disk drives made by Telex, Memorex, Potter, Ampex, Marshall, Calcomp, Storage Technology, and others -- are equivalent to those made by IBM but offered at a lower price. They caught on quite well as the recession worsened and users realized they could save money without sacrificing computer capability. Of late, however, two moves by IBM have hurt the independents:

1) The fixed-term lease plan and purchase discount made IBM more price competitive and less vulnerable, since many users opted for two-year lease contracts that won't expire for another year and a half.

2) The start-up of volume System/370 deliveries -- with IBM's advanced 3330 disk drive and 3420 tape system plus built-in controllers on some of the models -- has dampened demand for older type products. The stop-gap double-density disk drive hasn't really caught on, but independents will soon be delivering IBM equivalents again.

Because of the shifting product mix and long lead time now necessary to unhook many IBM customers, EDP/IR sees shipments of plug-compatible auxiliary memory products holding level -- at the $250 million level -- this year. In some ways, however, this may be a blessing in disguise for the independents. Most of them were forced to offer their equipment on a rental basis, and a year of level shipment activity will help revenues catch up with prior capital outlays.

In the off-line segment of the independent peripheral market, the biggest dollars come from various key-entry systems -- key-to-tape, shared processors (key-to-disk), and buffered keypunches. The demand for most of these is peaking, so shipments of this type equipment will be up only some 8% to $450 million this year. On-line key entry -- through intelligent/CRT terminals -- will be catching on as IBM sets the pace. Its current effect on the total numbers is small, however, and terminal growth (EDP/IR Jan.17,1972) is hidden in the other numbers.

Supplies revenues climbed slowly in 1971, damped by a decreasing use of magnetic tape, and less paper use because of lower levels of business operations. Purchases of tape reels will be off again this year, but 3336 disk pack purchases will increase substantially. So, with cards and paper returning to their 8% annual growth rate, the total supplies market should be up almost 10% in 1972.

Services is the real computer industry growth area of the 1970s, and will be the subject of a special issue soon. Revenues were up "only" 18% in 1971, and this year should resume the steady 22% to 23% growth rate forecast for the next five years. Within this category are two subsectors: The batch service area itself is growing at a comfortable 13% to 14%; the on-line service area -- items such as timesharing, remote-batch service, and the like -- will clip along at a 35% growth rate over the next five years.

Software revenues in Table IV show erratic growth patterns because they include both packaged products -- taking off quite well but from a low base -- and custom software -- in a decline caused by tight budgets. Over the next five years, packaged software will grow at about 25% from a $100 million level in 1971, with IBM probably capturing only 30% to 40% of the total. The custom side will have a slower growth rate, but will continue to contribute more dollars to the software revenue column than packages -- at least during the five years under study. The future of this market is somewhat in question, because there are indications that many future software functions will be handled by hardware.

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General Purpose Digital Computer (Group A) Census, shown below, are based on the best information available to the International Data Corporation, but are estimates. Computer manufacturers, as a rule, do not directly supply this type of information, and it is only through the use of IDC's extensive data files and other information sources that such estimates are possible. The computers included in Group A comprise the bulk of digital computers (by value) in operation. They are byte or character oriented -- with the exception of large-scale scientific machines -- and are primarily programmed with higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and specialized-purpose machines (page 14).

AS OF JANUARY 1, 1972

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	205	$ 4,600	1/54	1	6	7	X
	220	$ 14,000	1/58	3	2	5	X
	B-100 Series	$ 3,300	8/64	8	0	8	X
	B-200 Series	$ 6,500	11/61	218	138	356	X
	B-300 Series	$ 8,000	7/65	520	100	620	X
	B-500	$ 4,000	11/68	520	475	995	160
	B-2500	$ 6,800	2/67	270	123	393	40
	B-3500	$ 15,500	5/67	530	300	830	90
	B-4500	$ 29,000	11/71	4	0	4	50
	B-4700	$ 33,000	10/71	2	0	2	33
	B-5500	$ 35,000	3/63	137	43	180	X
	B-5700	$ 28,500	12/70	8	2	10	10
	B-65/6700	$ 68,000	11/69	32	30	62	20
	B-7700	$120,000	2/72	-	-	-	6
	Subtotals			2253	1219	3472	409
Control Data Corp.	G-20	$ 19,600	4/61	5	8	13	X
	1604/A/B	$ 42,000	1/60	23	4	27	X
	31/3150	$ 11,000	12/64	76	40	116	X
	3170	$ 17,500	12/70	23	9	32	6
	3200	$ 14,700	5/64	49	37	86	X
	3300	$ 21,500	9/65	110	97	207	15
	3400	$ 23,700	11/64	4	9	13	X
	3500	$ 26,000	1/69	8	11	19	4
	3600	$ 48,000	6/63	20	19	39	X
	3800	$ 53,000	12/65	15	5	20	X
	6200	$ 39,000	11/70	2	2	4	]
	Cyber-72	$ 32,900	10/71	1	0	1	] 6
	6400	$ 52,000	5/66	58	39	97	]
	Cyber-73	$ 45,000	3/72	-	-	-	] 9
	6500	$ 68,000	12/67	15	5	20	2
	6600	$115,000	8/64	61	36	97	X
	Cyber-74	$105,000	3/72	-	-	-	7
	6700	$125,000	7/70	4	1	5	0
	7600	$165,000	1/69	13	1	14	]
	Cyber-76	$165,000	3/72	-	-	-	] 4
	Star-100	$260,000	1/72	-	-	-	2
	Subtotals			487	323	810	55
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	16	9	25	X
	1040/1050	$ 13,300	10/67-12/71	142	58	200	]
	1055	$ 25,000	12/71	3	0	3	]22
	1070/1077	$ 34,600	6/72- 9/72	-	-	-	5
Friden	System 10	$ 2,500	10/70	200	60	260	490
Honeywell Information Systems	Gamma 10	$ 1,950	7/64	0	1,170	1,170	X
	G-5X Series	$ 1,400	1/66	112	1,805	1,917	150
	G-105	$ 1,350	3/69	58	90	148	25
	G-115	$ 2,500	4/66	262	1,210	1,472	115
	G-120	$ 4,500	1/70	25	210	235	50
	G-130	$ 4,400	10/69	3	90	93	20
	G-205/215	$ 4,500	9/63- 6/64	18	0	18	X
	G-210	$ 16,000	3/60	18	0	18	X
	G-225/255	$ 13,000	4/61-10/67	156	22	178	X
	G-235/265	$ 17,000	4/64-10/65	72	30	102	X
	G-245/275	$ 18,000	2/68-11/69	5	4	9	2
	G-405/410	$ 9,000	2/68-11/69	36	11	47	7
	G-415/420	$ 14,000	5/64- 6/67	198	261	459	X
	G-425/430	$ 17,000	6/64- 6/69	81	100	181	X
	G-435/440	$ 22,000	9/65- 7/69	47	38	85	6
	615	$ 55,000	6/69	21	19	40	X
	625	$ 65,000	4/65	1	4	5	X
	635	$ 80,000	5/65	65	15	80	X
	645	$120,000	7/66	3	0	3	X
	6030/6040	$ 25,000	6/71- 3/72	7	5	12	45
	6050/6060	$ 46,500	7/71- 3/72	5	3	8	28
	6070/6080	$ 61,500	7/71- 3/72	2	2	4	17
	G-Subtotal			1,195	5,089	6,284	465
	H-105	$ 2,100	11/71	20	3	23	NA
	H-110	$ 3,200	9/68	195	205	400	55
	H-115	$ 4,100	3/70	330	120	450	150
	H-115/2	$ 6,600	1/71	300	25	325	160
	H-120	$ 5,000	1/66	760	320	1,080	X
	H-125	$ 7,400	12/67	150	350	500	65
	H-200	$ 7,600	3/64	740	345	1,085	X
	H-1015	$ 11,800	4/71	55	23	78	65
	H-12/1250	$ 12,500	2/66- 8/68	425	193	618	X
	H-2015	$ 12,800	2/71	80	15	95	60
	H-2200	$ 19,600	1/66	130	69	199	X
	H-3200	$ 24,000	2/70	48	23	71	20
	H-4200	$ 31,000	9/68	26	6	32	6
	H-8200	$ 73,000	2/69	18	3	21	5
	H-4/1400	$ 13,200	12/61- 1/64	42	37	79	X
	H-800	$ 28,500	12/60	55	13	68	X
	H-1800	$ 46,000	7/64	12	3	15	X
	H-Subtotal			3,386	1,753	5,139	586
	HIS-Subtotal			4,581	6,842	11,423	1,051

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AS OF JANUARY 1, 1972

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
IBM	System-3/6	$ 1,140	12/70	1,620	330	1,950	]
	-3/10	$ 1,600	1/70	3,500	770	4,270	]4200
	360/20	$ 4,200	12/65	8,400	5,950	14,350	X
	360/22	$ 5,600	7/71	360	25	385	550
	360/25	$ 8,000	10/68	2,380	1,270	3,650	200
	360/30	$ 12,300	6/65	6,000	3,100	9,100	X
	370/135	$ 16,200	5/72	-	-	-	2400
	360/40	$ 22,000	5/65	3,150	2,100	5,250	X
	370/145	$ 28,900	7/71	450	175	625	1600
	360/44	$ 13,800	7/66	100	103	203	X
	360/50	$ 36,500	8/65	1,225	695	1,920	X
	370/155	$ 50,900	2/71	490	170	660	780
	360/65	$ 69,000	11/65	610	250	860	X
	370/165	$ 89,000	6/71	88	26	114	255
	360/67	$138,000	6/66	66	11	77	X
	360/75	$ 91,000	1/66	53	25	78	X
	360/85	$155,000	10/69	22	9	31	X
	360/9X	$150,000	11/67	15	3	18	X
	360/195	$210,000	3/71	4	1	5	5
	370/195	$215,000	5/73	-	-	-	3
	1130	$ 2,200	2/66	4,090	2,100	6,190	150
	305	$ 3,600	12/57	1	22	23	X
	650	$ 4,800	12/54	4	34	38	X
39	1401	$ 6,200	9/60	1,620	1,790	3,410	X
	1401-G	$ 2,300	5/64	270	108	378	X
	1401-H	$ 1,300	6/67	150	36	186	X
	1410	$ 17,000	11/61	147	91	238	X
	1440	$ 4,100	4/63	660	580	1,240	X
	1460	$ 9,800	10/63	87	54	141	X
	1620	$ 4,000	9/60	430	280	710	X
	7010	$ 26,000	10/63	22	13	35	X
	7030	$160,000	5/61	3	1	4	X
	704	$ 32,000	12/55	2	3	5	X
	7040	$ 25,000	6/63	20	23	43	X
	7044	$ 36,500	6/63	16	18	34	X
	705	$ 38,000	1/56	10	5	15	X
	7070/74	$ 27,000	3/60- 2/61	138	46	184	X
	7080	$ 60,000	8/61	54	1	55	X
	7090	$ 63,500	8/60	23	19	42	X
	7094	$ 73,400	9/62	66	9	75	X
	7094-II	$ 79,400	4/64	16	0	16	X
	Subtotals			36,362	20,246	56,608	10,143
NCR	Century-50	$ 1,650	2/71	190	10	200	135
	Century-100	$ 2,600	9/68	1,500	525	2,025	170
	Century-200	$ 7,700	9/69	460	215	675	120
	Century-300	$ 20,000	2/72	-	-	-	20
	304	$ 10,000	1/60	12	2	14	X
	310	$ 1,000	5/61	10	3	13	X
10	315	$ 7,000	5/62	340	370	710	X
	315-RMC	$ 9,000	9/65	125	50	175	X
	390	$ 800	5/61	250	375	625	X
	500	$ 1,000	10/65	950	1,700	2,650	X
	Subtotals			3,837	3,250	7,087	445
Philco	1000	$ 7,000	6/63	23	1	24	X
	210/211	$ 40,000	10/58	12	1	13	X
	212	$ 52,000	1/63	11	1	12	X
RCA	2	$ 14,600	7/71	40	0	40	40
	3	$ 19,600	10/71	10	0	10	6
	6	$ 29,900	10/71	3	0	3	8
	7	$ 40,100	10/71	5	0	5	12
	Spectra 70/15	$ 5,100	9/65	23	0	23	X
	Spectra 70/25	$ 7,900	9/65	3	3	6	X
	Spectra 70/35	$ 13,600	1/67	150	6	156	X
	Spectra 70/45	$ 23,100	11/65	350	27	377	X
	Spectra 70/46	$ 40,200	11/68	50	4	54	10
17	Spectra 70/55	$ 41,600	11/66	17	2	19	X
	Spectra 70/60	$ 43,100	9/70	14	0	14	5
	Spectra 70/61	$ 55,000	3/71	10	0	10	14
	301	$ 9,500	10/60	223	17	240	X
	3301	$ 25,000	7/64	72	0	72	X
	501	$ 17,000	6/59	29	2	31	X
	601	$ 50,000	11/62	4	0	4	X
	1600	$ 2,700	1/69	49	0	49	X
	Subtotals			1052	61	1113	95
Standard Computer Corp.	IC-4000	$ 9,000	9/68	10	0	10	X
	IC-6000	$ 16,000	5/67	9	0	9	X
	IC-7000	$ 17,000	6/69	18	0	18	X
Univac	I/II	$ 25,000	3/51-11/57	3	2	5	X
	III	$ 25,400	8/62	44	45	89	X
	SS-80/90	$ 8,000	8/58	53	67	120	X
	418-I/II	$ 13,700	6/63- 9/64	85	81	166	X
	418-III	$ 19,600	7/69	35	50	85	10
	491/492	$ 27,000	12/61	18	14	32	X
	494	$ 41,400	2/66	54	41	95	X
	1004	$ 1,900	2/63	1100	1260	2360	X
	1005	$ 2,550	4/66	840	190	1030	X
	1050	$ 8,800	9/63	195	180	375	X
	1103/1105	$ 35,000	12/50- 9/58	3	2	5	X
30	1106	$ 40,000	12/69	36	50	86	30
	1107	$ 57,000	10/62	14	16	30	X
	1108	$ 68,000	9/65	148	82	230	X
	1110	$ 79,000	5/72	0	0	0	8
	9200	$ 1,700	6/67	1500	740	2240	125
	9300	$ 4,000	9/67	810	880	1690	150
	9400	$ 10,000	5/69	185	174	359	70
	9700	$ 21,000	8/72	-	-	-	10
	Larc	$135,000	5/60	1	0	1	X
	Subtotals			5124	3874	8998	403
XDS	Sigma-5	$ 11,500	8/67	130	33	163	16
	Sigma-6	$ 20,000	11/70	13	3	16	7
	Sigma-7	$ 24,000	12/66	85	22	107	5
7	Sigma-8	$ 19,000	9/71	3	0	3	8
	Sigma-9	$ 44,000	11/71	2	2	4	6
	940	$ 24,000	4/66	69	3	72	X
	9300	$ 8,500	11/64	26	6	32	X
	Subtotals			328	69	397	42
	TOTALS			54,468	36,014	90,482	13,160

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DEDICATED APPLICATION DIGITAL COMPUTER CENSUS

The following data about Dedicated Application (Group B) computers is based on the best information available to the International Data Corporation, and much of it has been verified by the manufacturers. Comments or corrections should be directed to the attention of EDP/IR's census editor, Walter E. Misdom.

Group B computers, as defined by IDC, include those commonly called mini-computers and certain larger systems usually designed or used for one application, such as process control, data acquisition, or the like. These computers are word oriented (most commonly 8, 12, or 16 bits per word), usually purchased, and predominantly programmed in assembly language or Fortran. They are categorized as:

Price Class 1 -- less than $25,000 average system price;
Price Class 2 -- $25,001 to $50,000 average system price;
Price Class 3 -- $50,001 to $100,000 average system price;
Price Class 4 -- more than $100,000 average system price.

AS OF JANUARY 1, 1972

NAME OF MANUFACTURER	COMPUTER MODEL	NOTES	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Atron (MDS)	501	a	8	2	8	35	9/69	115	10	125	NA
Autonetics	Recomp-II		40	4	95	127	11/58	20	5	25	X
	Recomp-III		40	3	65	94	6/61	7	2	9	X
Bailey Meter	750		25	4		110	6/60	32	3	35	X
	755		25	4	80	330	11/61	6	0	6	X
	756		25	4	90	180	2/65	16	6	22	X
	855/25		25	4	100	400	12/68	11	0	11	15
BIT	480		8	1	6	7	12/66	195	3	198	X
	483		8	1	9	12	1/70	100 +	35 +	135 +	NA
Bunker Ramo	130		15	3		90	10/61	160	27	187	X
	133		15	4		108	5/64	79	9	88	X
	230		15	4		134	8/63	15	2	17	X
	300		29	4		275	3/59	18	5	23	X
	330		29	4		275	12/60	19	5	24	X
	340		29	4		375	12/63	19	3	22	X
	1018			1		23	6/71	NA	NA	NA	NA
Cascade Data Computer	80/20		8	2	29	35	6/70	10 +	0	10 +	NA
	80/30		8	2	32	40	1/70	25 +	0	25 +	NA
Cincinnati Milacron	CIP/2000	b	9	1	2	4	12/69	NA	0	NA	210 +
	CIP/2100	b	9	1	5	7	7/69	NA	0	NA	15 +
	CIP/2110			1	5	8		NA	0	NA	NA
	CIP/2200							NA	0	NA	NA
	CIP/4000		20					NA	0	NA	NA
Clary Datacomp	404		16	1	12	25	11/69	100	20	120	NA
Collins Radio	8311			1	15	17	1/68	NA	NA	NA	NA
	8400			4		950	11/62	25	5	30	X
	8500		32	4	200	1000	1/67	53	16	69	X
Compiler Systems	CSI-16		16	2	11	50	11/70	20 +	0	20 +	80
Inc.	CSI-24		24	3	15	75	12/70	NA	0	NA	30
Computer Automation	108		8	1	5	8	1/71	40 +	0	40 +	NA
Inc.	208/808		8	1	5	8	4/68	220	20	240	X
	116		16	1	8	11	8/70	50	0	50	NA
	216		16	1	8	13	7/69	220	20	240	90
	816		16	1	10	15	12/68	40	5	45	X
	Alpha-8		8	1	3		12/71	1	0	1	NA
	Alpha-16		16	1	4		9/71	NA	0	NA	NA
	Subtotal							571	45	616	90
Computer Development	CD-2000		8	1	7		8/70	NA	0	NA	NA
Computer Logic Systems	CLS-18		18	1	9	14	3/71	NA	0	NA	NA
Computer Signal Processors	CSP-30		16	4	85	120	6/70	9 +	0	9 +	NA
Comten Inc.	10			1		17	7/69	35	0	35	NA
	20		8	3		80	3/71	20	0	20	55 +
	40		8	4	125	270	8/69	22	0	22	NA
	60		8	4	150	200	6/69	18	0	18	NA
Control Data Corp.	160		12	4	60	112	5/60	49	11	60	X
	160-A		12	4	90	225	7/61	200	65	265	X
	160-G		13	4		535	3/64	35	0	35	X
	924/A		24	4		430	8/61	26	1	27	X
	1700		16+2	4	37	170	4/66	358	97	455	X
	1700-SC		16+2	3		100	4/70	93	42	135	30
	8090		12	3		96	5/64	116	89	205	X
	8092		8	3		67	6/64	56	14	70	X
	G-15		29	3		61	7/55	265	18	283	X
	LGP-21		32	2		42	12/62	140	13	153	X
	LGP-30		32	3	49	59	8/56	290	43	333	X
	RPC-4000		32	4	87	101	10/60	61	12	73	X
	CSC-46		21	4		250	/54	10	0	10	X
	CSC-136		25	4		275	/60	4	1	5	X
	CSC-636		15	4		300	10/63	13	2	15	X
	Elbit-100		12	1	6	7	6/67	5	445	450	X
	M-1000			1		1	/71	9	0	9	NA
	Subtotals							1730	853	2583	30
Datacraft	6024-1		24	4	51	100	5/69	14	0	14	X
	6024-3		24	3	33	75	2/70	42	6	48	30
	6024-5		24	1	11	21	12/71	1	0	1	5
Data General	Nova		16	1	8	11	2/69	821	100	921	55
Corp.	Nova-800		16	1	7	10	3/71	86	5	91	90
	Nova-1200		16	1	5	9	12/70	659	70	729	385
	Supernova		16	1	10	14	5/70	153	20	173	65
	Supernova-SC		16	1	14	19	6/71	15	0	15	30
	Subtotals							1734	195	1929	625
Datamate Computer	DM-16		16	2	17	26	11/69	12	0	12	X
Systems	DM-70		16	1	9	15	12/70	20 +	0	20 +	NA
	DM-70/ROM		16	1	4	6	10/70	NA	0	NA	NA
	ECP-18		18	1	14	15	11/66	21	0	21	X
Digiac Corp.	3060			1	9	13	1/70	45	0	45	7
	3080		25	1	20	25	12/64	16	0	16	X
	3080-C		25	2	26	30	10/67	8	0	8	X
Digital Computer	D-112		12	1	4	10	8/70	295	55	350	210
Controls	D-116		16	1	3	10	1/72	--	--	--	150
	D-216		16	1	8	16	8/71	42	8	50	100

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NAME OF MANUFACTURER	COMPUTER MODEL	NOTES	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Digital Equipment Corp.	PDP-1		18	4	120	136	11/60	37	4	41	X
	PDP-4		18	3		74	8/62	30	3	33	X
	PDP-5		12	2	30	36	9/63	62	29	91	X
	PDP-7		18	3		66	11/64	68	26	94	X
	PDP-8		12	1	18	24	5/65	950	450	1400	X
	PDP-8/E		12	1	5	10	4/71	2290	560	2850	500
	PDP-8/I		12	1	13	25	3/68	2265	860	3125	X
	PDP-8/L		12	1	8	20	10/68	3090	610	3700	X
	PDP-8/S		12	1	10	18	9/66	715	205	920	X
	PDP-8/Linc		12	2	38	48	9/66	82	52	134	X
	PDP-9		18	3	35	70	12/66	295	140	435	X
	PDP-9/L		18	2	20	33	11/68	34	14	48	X
	PDP-11		16	1	11	15	4/70	1435	450	1885	470
	PDP-12		12	2	15	35	4/69	440	145	585	40
	PDP-15		18	3	16	55	2/70	360	150	510	50
	Subtotals							12,153	3,698	15,851	1,060
Digital Scientific Corp.	Meta-4		18	4	15	60	4/70	27 +	0	27 +	NA
Electronic Associates Inc.	640		16	2	27	50	6/67	105	60	165	X
	1020		16	1	20	25	2/64	100	25	125	X
	8400		32	4	200	400	6/65	19	6	25	X
Electronic Processors	EPI-118		18	1	6	14	11/70	NA	0	NA	NA
EMR Computer	210		21	4	94	132	4/62	9	0	9	X
	420		42	4	324	450	6/63	3	0	3	X
	2100		21	4	65	143	12/63	8	0	8	X
	6020		24	4	72	176	4/65	15	2	17	X
	6040		24	4	98	224	7/65	10	1	11	X
	6050		24	4	123	360	2/66	19	6	25	X
	6070		24	4	240	600	10/65	1	2	3	X
	6120		16	1	8	16	7/70	NA	NA	NA	NA
	6130/6135		18	4	85	200	10/67	61	12	73	X
	6145		16	4	135		7/72	-	-	-	NA
Foto Mem, Inc.	Centauer-100		16	1	6	9	4/70	18	0	18	X
Four Phase Systems	IV/70		18	1	6		3/71	90	0	90	NA
Foxboro	Fox-1		24	4	150		1/72	-	-	-	NA
	2/10			2		50	/72	-	-	-	NA
	2/30			3		80	/72	-	-	-	NA
General Automation Inc.	GA-18/30		18	2	18	50	7/69	105	15	120	35
	SPC-12		8	1	4	17	1/68	900	100	1000	125
	SPC-16		16	1	8	25	5/70	160	20	180	85
GE/PAC	30	c	8	1	7	25	5/69	104	11	115	NA
	312		20	4		200	3/60	27	6	33	X
	412		20	4		300	7/62	39	8	47	X
	3010		16	3	13	90	5/70	24	4	28	NA
	3010/2		16	4	30	140	5/72	-	-	-	NA
	4010		24	4	76	200	10/70	12	1	13	30
	4020		24	4	79	240	2/67	215	70	285	NA
	4040		24	4		120	8/64	45	20	65	X
	4050		24	4		280	12/66	23	2	25	X
	4060		24	4		340	6/65	18	2	20	X
	4070		24	4	300	1500		-	-	-	NA
	Subtotals							507	124	631	30
GRI Computer Corp.	909		16	1	4	8	1/70	120	20	140	25
Hewlett Packard Co.	2000-A	d	16	4	89	101	11/68	156	65	221	X
	2000-B	e	16	4	119	134	8/70	10	2	12	X
	2000-C		16	4	187	205	3/71	12	2	14	NA
	2000-E		17	3	50		7/72	-	-	-	NA
	2000-F			4	110		7/72	-	-	-	NA
	2005-A	f	16	3	72	85	6/69	26	6	32	X
	2007-A	g	16	1	20	20	9/68	43	11	54	X
	2100-A		16	2	7	35	10/71	NA	NA	NA	NA
	2114-A		16	1	10	16	10/68	409	109	518	X
	2114-B		16	1	9	15	11/69	525	140	665	NA
	2115-A		16	2	15	26	11/67	267	65	332	X
	2116-A		16	2	22	32	11/66	88	17	105	X
	2116-B		16	2	24	40	9/68	650	162	812	X
	2116-C		16	2	20	45	11/69	324	21	345	NA
	Subtotals							2510	600	3110	400
Honeywell	19		19	4		140	5/61	3	0	3	X
	21		20	3		63	2/66	41	25	66	X
	24		24	4		200	5/63	82	3	85	X
	112		12	1	5	10	11/69	160	30	190	40
	116		16	3		65	4/68	172	35	207	X
	124		24	4	65	130	3/66	109	18	127	X
	224		24	4	75	380	3/65	55	8	63	X
	290		18	4		175	11/60	10	2	12	X
	316		16	2		50	6/69	1000	320	1320	NA
	324		24	4		250	7/68	12	0	12	X
	416		16	2	17	43	4/67	198	130	328	X
	516		16	3	35	105	10/66	655	190	845	X
	632		32	4	97	450	12/68	10	4	14	X
	1642		16	4	144		4/71	NA	NA	NA	NA
	1644		16	4	192		4/71	NA	NA	NA	NA
	1646		16	4	252		4/71	NA	NA	NA	NA
	1648/A		16	4	375	440	12/69	18	5	23	X
	Subtotals							2525	770	3295	NA
IBM	1710/1720		6	4		225	2/62	13	17	30	X
	1800		18	4	47	235	2/66	690	410	1100	X
	System-7		16	2	17	42	9/71	200	25	225	1000
	Subtotals							903	452	1355	1000
Imlac	PDS-1		16	1	10	11	2/70	NA	0	NA	NA
Information Technology, Inc.	4900/5		8	1	3	5	10/70	NA	0	NA	NA
	4900/10		16	1	10	20	10/65	25	0	25	X
	4900/20		12/32	2	30	50	10/69	10 +	0	10 +	NA

NOTES:

a. Used in Mohawk 2400 system
b. Microdata 800 cross-licensed version
c. Cross-licensed version of Interdata-1
d. Utilizes 2116-B
e. Utilizes 2114-B or 2116-B
f. Utilizes 2116-B (RTES)
g. Utilizes 2115-A or B (Educ. Basic System)
h. Cross-licensed version of DG - Nova
i. Incl. est. 90 units used in-house
j. Mnfr. by Photon, Inc.
k. Utilizes XDS - Sigma 2
l. Version of CAI-116
x. No longer manufactured

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AS OF JANUARY 1, 1972

NAME OF MANUFACTURER	COMPUTER MODEL	NOTES	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Interdata	1		8	1	4	11	11/70	150	50	200	50
	2		8	1	9	11	7/68	20	0	20	X
	3		16	1	13	20	5/67	200	20	220	X
	4		16	1	9	17	8/68	260	115	375	40
	5		16	1	11	25	11/70	70	20	90	10
	15		16	2	22	35	1/69	40	24	64	X
	50		16	1	7		1/72	-	-	-	NA
	55		16	1	16		1/72	-	-	-	NA
	70		16	1	7		8/71	NA	NA	NA	60 +
	80		16	2	16		5/72	-	-	-	NA
	Subtotals							740	229	969	160 +
Interplex	System-1		16	2	47	47	9/70	NA	0	NA	NA
Lockheed Electronics	MAC-16		16	1	11	22	3/69	295	30	325	]
	MAC-Jr.		16	1	8	16	11/70	195	20	215	] 150
	Sue		16	1	4	8	2/72	-	-	-	NA
Microdata Corp.	400		8	1	3	4	1/72	-	-	-	NA
	800		9	1	3	8	1/69	154	41	195	NA
	810		8	1	6	10	5/69	310	10	320	NA
	812		8	1	11	15	12/69	32	0	32	NA
	820			1	6	13	10/70	28	0	28	NA
	1600		16	1	5	11	2/72	-	-	-	NA
Mini Comp.	MD-708		8	1	5	7	8/70	25 +	0	25 +	NA
	Administrator-2		16	3	35	52	12/70	NA	0	NA	NA
	Multi User-E		16	3	67	85	11/70	NA	0	NA	NA
	Multi User-I		16	3	40	58	1/71	NA	0	NA	NA
Modular Computer Systems	Modcomp-I		16	1	5		11/71	NA	0	NA	NA
	Modcomp-II		16	2	10	27	7/71	NA	0	NA	] 300
	Modcomp-III		16	3	14	65	12/70	NA	0	NA	]
Motorola Comm. Div.	MDP-1000		8	1	8	19	2/69	50 +	0	50 +	NA
Nuclear Data, Inc.	ND-812		12/24	1	7	10	1/71	NA	0	NA	NA
Omnicomp Computer Corp.	Omnus-1		16	1	5	12	4/71	NA	0	NA	NA
Qantel Corp.	Quantel-V		8	2	14	26	4/70	70 +	0	70 +	NA
Raytheon Computer	703		16	1	13	23	10/67	171	31	202	X
	704		16	1	10	18	4/70	100	35	135	50
	706		18	2	19	30	5/69	60	14	74	X
	PB-250		22	2	33	48	12/60	155	20	175	X
	PB-440		24	4		140	3/64	18	2	20	X
	PB-520		24	4		128	10/65	26	1	27	X
Redcor Corp.	RC-70		18	2	15	30	7/68	125	15	140	X
Rolm Corp.	1601	h	16	2	20	28	3/70	40	5	45 +	NA
Sanders	Series 800		16				12/71	-	-	-	NA
Scientific Control Corp.	600 Series		24	3	31	80	10/65	230	0	230	X
	4700		16	3	15	50	4/69	23	0	23	NA
	DCT-132		8	2	28	30	5/69	51	19	70	NA
Spear	Microlinc		12	3	46	57	6/66	33	3	36	X
Spiras Systems/USM	65		16	2	19	40	8/69	25	0	25	NA
Sys. Computer Corp.	1000				4		1/72	93	0	93	NA
	1500										NA
Systems Eng. Labs.	810		16	2	38	45	9/65	24	0	24	X
	810-A		16	3	18	90	4/67	236	10	246	X
	810-B		18	4	30	150	12/68	95	5	100	X
	840		24	3	65	80	11/65	3	0	3	X
	840-A		24	3	60	75	8/66	36	2	38	X
	840-MP		26	4	49	250	12/67	33	0	33	X
	72		16	2	19	40	9/70	7	0	7	NA
	85		32	4	150	240	7/72	-	-	-	NA
	86		32	4	200	325	6/70	14	0	14	NA
	88		32	4	350	600	3/71	1	0	1	NA
Tempo Computers/GTE	1		16	1	14	22	12/69	50	0	50	NA
Texas Instruments	960		18	2	14	30	6/70	20 +	0	20 +	NA
	960-A		16	1	3						
	980	i	17	2	17	40	5/68	100 +	0	100 +	NA
Unicom, Inc.	CP-8A		8	1	3		2/70	32 +	2	34 +	40 +
	CP-8B		8	1	3		3/70	20 +	0	20 +	32 +
	CP-8C		8	1	5		3/70	30 +	4	34 +	61 +
	CP-8D		8	1	7		4/70	9 +	0	9 +	3 +
Unicomp, Inc.	Comp-16		16	2	11	27	6/70	14 +	0	14 +	7 +
	Comp-18		18	2	12	38	8/70	20 +	0	20 +	12 +
Varian	520/i		9	1	6	13	9/68	300	140	440	340
	610		12	1		15	7/64	10	0	10	X
	620		16	2		37	11/65	75	0	75	X
	620/i		18	1	10	20	9/67	1600	85	1685	NA
	620/f		16	1	11	25	11/70	150	25	175	100 +
	620/1		16	1	5	12	6/71	40	10	50	NA
	R 620/i		18	2	14	28	7/68	28	2	30	X
	R 622/i		18	2	15	30	7/68	90	10	100	NA
	Subtotals							2293	272	2565	440 +
Varisystems	PAC-16	j	16	1	4		9/69	20 +	0	20 +	NA
Wang Labs, Inc.	3300		8	2	14	40	8/71	NA	NA	NA	45 +
Weismantel Assoc.	WAICO M-16		16	4	90	120	11/70	NA	NA	NA	NA
Westinghouse Elec. Corp.	P-50		14	1	16	23	8/64	203	19	222	X
	P-250	k	16	3	40	62	9/67	58	10	68	X
	P-510		18	4	85	110	6/63	21	2	23	X
	P-550		18	4	85	110	6/63	9	4	13	X
	P-580		18	4	85	110	6/63	9	0	9	X
	P-2000		16	2	10	27	8/69	120	27	147	25
	2500		16	2	10	30	11/71	6	0	6	75
	Subtotals							426	62	488	100
Xerox Data Systems	92		12	3		90	4/65	42	8	50	X
	910		24	4		120	8/62	168	15	183	X
	920		24	4		150	9/62	111	19	130	X
	925		24	4		200	12/64	13	2	15	X
	930		24	4	80	400	6/64	112	18	130	X
	CE-16		16	1	8	13	5/69	17	0	17	NA
	CE-16/A		16	1	15	25	12/69	50	0	50	NA
	CF-16/A	l	16	1	8	17	11/70	25	0	25	NA
	Sigma-2		16	4	24	125	12/66	210	40	250	X
	Sigma-3		17	4	24	140	1/70	140	40	180	NA
	Subtotals							888	142	1030	NA
	TOTALS							33,523	8,205	41,728	

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Review and Forecast

EIDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MARCH 12,1971 • VOL.6,NO.9 P.J.McGOVERN,EDITOR

A year of contrasts

SHIPMENTS PLATEAU FOR THIRD STRAIGHT YEAR AS U.S. FEELS ECONOMIC PINCH; INDUSTRY REVENUES UP 15%; NEW PRODUCT DIRECTIONS SET BY IBM, OTHER MAINFRAMERS

Definitely flattening what had been an ever-increasing growth curve, computer shipments by U.S. manufacturers, for the third year in a row, hovered just above the $7 billion level in 1970, barely squeaking out a 1% growth to almost $7.3 billion worldwide. But by almost every other yardstick, however, things really measured up well for the computer industry . . . fighting as it was the undertow of economic recession and the end of IBM's computer generation marketing cycle.

- Total worldwide computer-related revenues to U.S.-based companies steadily climbed another 15%, approaching the $12-billion level.

- International shipments of computer hardware were up about 25%, underscoring the importance of multinational operations and completely offsetting the drop in U.S. shipments to the lowest level since 1967.

- Users continued to increase spending, even in the U.S., where only about 40% reported the economy pinching their budgets. Many, however, turned to lower cost independent peripherals as an economy move.

And 1970 was filled with announcements that set the style of computer hardware for the next several years. As a result, users will not be asked to "reset to zero" and move upward with an incompatible system. Starting at midyear:

+ IBM spelled out the first models of System/370, introduced System/7 as its entree into the manufacturing automation portions of many businesses, and brought state-of-the-art technology to the marketplace with the 145 and 135 and their semiconductor memories.

+ RCA countered with its 2, 3, 6, and 7 -- going after a healthy chunck of the IBM 360 base with an enlarged sales force.

+ Burroughs improved its product line, offering its 700 family to customers and talking in terms of large multi-processing systems.

+ NCR and Univac added more models to their current product series, and Honeywell -- busy integrating the GE computer interests -- brought out several price/performance improved versions of previous equipment.

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Thus, with product directions basically set by IBM and the other major manufacturers, EDP/IR anticipates a new round of shipment increases. The peaks and valleys won't be quite so pronounced this time around, but worldwide shipments by U.S. manufacturers are expected to increase in the neighborhood of 15% for the next two years, slowing to about 10% by the mid-1970s. By that time, however, annual shipments of computers should be in the $12 billion to $13 billion range.

During the "pause" in shipment growth that has just passed, several interesting phenomena emerged in the structure of the computer industry. Plug-to-plug compatible equipment has been accepted by users, third-party leasing companies declined in relative importance, and unbundling has yet to have much effect on the industry as a whole.

But most important by any standard has been the clear illustration of the "flywheel effect" caused by both the sheer bulk of the industry as well as its basic rental nature: Most users are locked in to an ever-increasing volume of computer expenditures and, as a result, total revenues to computer companies will continue to increase. With a $30 billion installed base, the computer industry will never see the dramatic gyrations of the mid-1960s.

Preliminary forecasts for 1971 -- prepared by the International Data Corporation, publisher of EDP Industry Report -- indicate:

- Worldwide shipments will be up about 15% to well over $8 billion, and IBM will set the industry pace;
- Total industry revenues will be up 17% to 18%, to the $14 billion level, with revenues from general-purpose computers up about the same percentage;
- Service segments of the industry will continue to be important, but hardware will still account for 75% of total revenues.

Throughout this issue, as is always the case for EDP/IR, the term shipments means totally new-built equipment. It is our best estimate of factory production and includes complete new systems, peripheral equipment or "add-on" shipments such as additional core memory for existing central processors, and terminals for use with computer systems. It does not include equipment merely re-shipped from one customer to another.

AFTER SECOND ANNUAL SHIPMENT DROP, IBM ONCE AGAIN WILL SET A HEALTHY PACE

IBM didn't close out 1970 with any record-breaking results. Shipments were up in the international marketplace, but off enough here to force worldwide output about 4% (or some $200 million) lower than 1969 in a second consecutive drop.

On the other hand, it really ended last year in a more normal position than might be imagined at first glance. The economic downturn has bottomed; a new product line has been introduced and shipments already have begun; and the backwash from a boom of System/360 shipments and third-party leasing purchases is over. EDP/IR thinks that IBM once more will settle down to its more traditional pattern of 15% to 17% growth.

Also, IBM seems to have returned to a traditional pattern in another sense. Its salesmen are out there swinging in the marketplace. Ever since the antitrust

ANALYSIS OF GENERAL PURPOSE COMPUTERS INSTALLED IN THE UNITED STATES
(Based on IDC Computer Installation Data File, January 1, 1971)

Size Class	Purchase Price	Rental Range	% by Number	% by $ Value
Small	less than $115K	less than $2,500	20	3
Medium	$ 115K - $ 460K	$ 2,500 - $10,000	44	19
Large	$ 460K - $1,850K	$10,000 - $40,000	33	59
Very Large	over $1,850K	over $40,000	3	19

guns were leveled at IBM during the winter of 1968-69, a certain cautiousness had creeped into the company's outward attitude. Lawyers seemed to be running things. But with salesmen not able to even approach what was perhaps an ambitious quota for 1970, and with the independent peripheral manufacturers stealing away business for economic reasons, IBM seemed to have reached a threshold of pain. Once again, the name of the game is all-out marketing.

And the product line is ready. Announcement after announcement was capped off this week when IBM introduced the 370/135 -- a very communications-oriented system. A thorough analysis of IBM's new line will appear in the next issue, but in a nutshell its products for the 1970s look like this:

- System/370, a new family of computers renting from $10,000 a month on up, brackets almost 80% (by value) of the base of existing computer users (see above). Though offering new features and better price/performance, the 135, 145, 155, and 165 are completely compatible with System/360 and emulate second-generation equipment much better than does the 360.

- System/3, Model 6, a small business computer that starts at less than $1,000 a month, seems to be IBM's way of affirming that it plans to switch most electronic accounting machine users over to the computer.

- System/7, dubbed a "sensor based" computer, has been talked about as a minicomputer. It could be used in the same way as many minis, and since it can be rented, it may bring new economics to the mini industry. But the computer will be marketed primarily for new control applications, and could well create in the factory a base for computer business comparable to that established in the office by the 1401 in the early 1960s.

IBM's marketing plans for System/370 seem primarily aimed at retaining customers. But in IBM's case, this philosophy opens a base for business that the same policy simply couldn't bring to other manufacturers. A significant amount of IBM equipment -- well over $2 billion -- is owned by third-party leasing companies; even more has been purchased by the users themselves. Thus, by simply switching users of this IBM equipment back to renting, the industry giant can make substantial revenue gains in addition to upgrading its present rental base.

With all this going for it, then, IBM's shipments are expected to be up more than 15% this year to the $5.5 billion level. Also, it should receive increasing amounts of business from services it began pricing separately at the start of 1970. Because of the economy and the age of installed computers, IBM didn't benefit greatly from its unbundled policy last year; indeed, with the price reduction, perhaps it just broke even. But with new machines being shipped and a growing number of new users, IBM will now have more program products to sell, new people to educate.

"OTHER" MAJOR MAINFRAMERS AGAIN OUTPERFORM IBM WITH 10% SHIPMENT INCREASE; INDEPENDENT PERIPHERALS ZOOM; OTHER SECTORS AVERAGE 24% REVENUE GAINS

Following a pattern very similar to that set in 1969, new computer shipment activity again last year was essentially level, with IBM down 4% (see above) and the other major manufacturers up, on average, 10%. Most of them continued the trend set a year before, with CDC down an even larger percentage, Burroughs, NCR, and DEC up not quite so much as in 1969. RCA had the real turnaround: Following a 10% shipment drop in 1969, it came back strong with an increase of 26% for 1970.

The overall industry picture, and IBM's relation to it, has been reviewed above; in the following pages we take a look at the other hardware manufacturers and at the various other sectors of the computer industry. In general, the industry proved its staying power and survived the economic downturn pretty well: Total computer revenues to American-based companies were up 15% in 1970, and are expected to increase another 18% or so this year.

Honeywell Information Systems, officially established last fall when Honeywell bought out General Electric's general-purpose computer interests, had shipments slide off 6% to just below $600 million on a pro forma basis. Still, however, it had merged its way solidly into the Number Two spot, and now is working out the reorganization necessary to take advantage of its doubled base.

During 1970, Honeywell did quite well with the small H-115 in a disk-only configuration. About 300 were ordered and delivered during the year, and the current backlog is about 200 more systems. After the merger, HIS also had an even smaller competitive computer in the GE 58. This European-designed computer competes with the IBM System/3, and HIS quickly changed a four-city test marketing situation to a national sales effort.

In the large systems area, the Gecos operating system and the new 6000 line (EDP/IR Feb.22,1971) could really open new markets for HIS. The biggest problem here is the operating system -- it is considered very good, but is difficult for both salesmen and customers to understand. An intensified training program for salesmen is designed to rectify this.

Honeywell's big entry in the data capture market, the Keytape, has peaked in shipment level, but HIS currently has great hopes for its Keyplex multi-station system. It is also active in the EDP education and service bureau business, and should maintain market share in most of its computer-related areas.

For several months, now, HIS has been making new product announcements, and more are expected; but these are mostly just price/performance improvements of existing products from both the Honeywell and GE lines. A new product line is direly needed, but most observers agree that it won't be announced during 1971. The true future of HIS, then, will not be clear until the new product line is set. In general, however, the company has most if not all the characteristics that lead to success in the computer industry, and its management is dedicated to turning its assets into a smoothly running and profitable operation. Shipments this year are expected to be up just a fraction to about $600 million.

Univac duplicated its gains of last year with another reasonable shipment increase of 11%, split between a level performance in the U.S. and about a 25% rise internationally. The 1106 did quite well, with over 40 units shipped worldwide, but only three or four customers have expressed serious interest in the 1110 so far.

TABLE I
STATUS OF WORLDWIDE COMPUTER MARKET FOR U.S.-BASED MANUFACTURERS

	1970 Shipments: $M	% Total	1969-70 % Change	Yearend 1970 In Use: $M	% Total
IBM	4,775	65.5	- 4	25,555	69.3
HIS	590	8.1	- 6	2,900	7.9
Univac	465	6.4	+11	2,220	6.0
Burroughs	410	5.7	+18	1,210	3.3
NCR	305	4.2	+55	805	2.2
RCA	275	3.8	+26	1,145	3.1
CDC	210	2.8	-19	1,545	4.2
DEC	100	1.4	+34	425	1.2
XDS	60	0.8	-13	425	1.2
Others	95	1.3	+35	570	1.6
Totals	7,285	100.0	+ 1	36,800	100.0

The company has carried out a very successful program of converting older 1108s to purchased systems that include modified 1004s or 1005s as remote-entry processors in a communications-oriented installation. Many customers don't realize this, knowing only that they have a special remote-batch terminal; but from Univac's point of view, it is a way of continuing to collect revenues on equipment that has been around for six to eight years.

Univac's biggest success story for 1970 comes in connection with its 1700 line of buffered keypunches. Over 25,000 of these units have been sold throughout the world, most of them replacing older IBM equipment. Now that IBM has its competitive 129 keypunch, Univac's shipments of these data entry devices will probably be slowed, especially since it probably has already signed up the "easiest" accounts. But the success of the 1700 goes to show that, from time to time, a competitor can made inroads into areas that IBM has considered sacrosanct.

During 1970, Univac was impacted by Federal Government cutbacks in new computer acquisitions, and this effect should continue. There will probably be a few announcements of middle-of-the-line improvements -- an extension of the 9000 series above the 9400 level -- but nothing dramatic is expected. 1971 shipments should be up by another 8% to 10% to about the $500 million level.

Burroughs announced the large end of its new 700 family during 1970, chalking up a better-than-average 18% gain in shipments to over $400 million. But the most talked about aspect of 1970 was the question of how well the 6500 actually works. Stories from the field are mixed. Users who ordered the 6500 as an upgrade from a 5500 doing foreground/background processing seem pleased; more ambitious customers with sights set on fancy multiprogramming applications have had to suffer with normal delays. These are primarily the fault of the MCP operating system, but it is considered basically a good system by users, and most of them continue to reflect their loyalty, knowing that eventually it will work.

Another flap occurred last year when TWA filed a lawsuit over a planned reservation system. The situation, obviously, reflects a misunderstanding between Burroughs and TWA over the scope of and responsibility for this effort. In vast information management systems such as those required for an airline, the hardware -- at least the central processor -- becomes almost insignificant. Instead of requiring a few programmer-months for fine tuning, an installation such as this necessitates hundreds of man-years. In any event, with this system out and with Univac no longer supplying a similar system for United Airlines, IBM now has every major airline's reservation business locked up with its Pars system.

Burroughs continues to be successful with its TC-500, and keeps bringing out new models for specialized applications. Over 2500 are now installed. And the new 700 family will probably prove a success -- once software problems are ironed out -- and smaller models will follow. It doesn't look like a system that will be highly competitive with IBM equipment, but it will provide a good upgrade for Burroughs customers and could win a few competitive situations. Shipments this year are expected to be up another 15% to 20% to the $480 million level, with stronger gains internationally than in the U.S.

NCR has meant computers for over a year, according to the national ads, and now it means "computers . . . and terminals." The company emphasized its point in 1970 by once again posting the highest shipment increase -- up 55% to just over $300 million -- of any computer manufacturer. The percentage increase was actually higher in the U.S. than abroad, indicating that there was room for success during a year of economic concern.

Two new systems -- the Century 300 and 50 -- were announced, but neither can be expected to have the success of the 100 or 200. The C-300, for example, will appeal almost exclusively to NCR users who want to upgrade their current equipment. The C-50 certainly appeals to a large base, but this is a base already impacted heavily by IBM with System/3. With this small computer, NCR for perhaps the first time will really be coming head-to-head with IBM in its sales efforts.

Prospects do look good in one area, as indicated by the advertisements. Last year NCR brought out its 280 retail terminal that could have great impact, and it had good success overseas with similar equipment as the United Kingdom turned to decimilization. With its well-established contacts in retail areas, NCR can likely expect to move more large companies over to terminal usage. But the fantastic growth rates simply can't continue, and we expect that NCR will have only a 20% to 25% shipment growth -- to the $380-million level -- for 1971. The increase should be at the same rate both within and outside the U.S., indicating the shift toward more upgrade business.

RCA, the only major manufacturer with no direct sales activities in the major international markets, did quite well in the U.S. last year, reflecting favorably on its new management team and increased sales force. Shipments were up over 30% to well above the $200 million level. Indeed, with a similar percentage increase expected to bring RCA's U.S. business to the $300-million level this year, it could close out 1971 nearly if not actually Number Two manufacturer in domestic shipments. On a worldwide basis, however, RCA is not expected to budge from its position as Number Six among the major manufacturers.

During 1970, RCA followed closely behind IBM in announcing new products -- the 2, 3, 6, and 7. These computers are essentially repriced versions of the Spectra 70/45, 46, 60, and 61, with expanded memory capacity. The machines seem to be

TABLE II

WORLDWIDE COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
		TOTAL		
1969	19,650	90,200	7,240	30.7
1970	22,650	109,400	7,285	36.8
1971	36,200	140,800	8,315	43.7
1972	49,000	183,100	9,720	51.9
1973	57,300	230,700	10,985	61.1
1974	66,800	286,500	12,145	71.3
1975	83,700	350,700	13,500	82.4
		GENERAL PURPOSE COMPUTERS (GROUP A)		
1969	13,430	70,400	6,820	29.5
1970	11,610	78,400	6,760	35.0
1971	20,100	95,100	7,685	41.3
1972	23,800	114,400	8,970	48.8
1973	27,700	136,500	10,105	57.2
1974	30,100	161,100	11,120	66.5
1975	35,800	189,500	12,310	76.6
		DEDICATED APPLICATION COMPUTERS (GROUP B)		
1969	6,220	19,800	420	1.24
1970	11,350	31,100	525	1.75
1971	16,500	47,300	630	2.35
1972	23,400	69,600	750	3.05
1973	29,300	96,700	880	3.86
1974	35,400	128,500	1,025	4.78
1975	42,500	165,700	1,190	5.83

price/performance competitive, but the company apparently is banking its success on marketing, a concept familiar to the top computer management team recruited from IBM during the latter part of 1969 (EDP/IR Aug.31,1970).

RCA's primary marketing efforts will be aimed at users of IBM 360/30s, 40s, and 50s (under DOS) that need memory more than souped-up CPUs. One characteristic of its approach will be a guaranteed conversion plan under which RCA promises to shift certain IBM users over to its equipment for a specified amount and within a specific amount of time. Also, RCA offers a six-year contract under which the user gets guaranteed price protection and essentially owns the computer after the

TABLE IV

DEDICATED APPLICATION COMPUTER MARKET (GROUP B)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Million Value In Use
		WORLDWIDE		
1969	6,220	19,800	420	1,240
1970	11,350	31,100	525	1,750
1971	16,500	47,300	630	2,350
1972	23,400	69,600	750	3,050
1973	29,300	96,700	880	3,860
1974	35,400	128,500	1,025	4,780
1975	42,500	165,700	1,190	5,830
		UNITED STATES		
1969	5,285	16,500	340	1,000
1970	9,680	25,600	400	1,390
1971	14,290	39,400	475	1,840
1972	20,320	58,750	565	2,365
1973	24,600	81,400	645	2,960
1974	27,900	106,200	725	3,610
1975	30,700	133,400	835	4,350
		INTERNATIONAL		
1969	925	3,300	80	240
1970	1,670	5,500	125	360
1971	2,210	7,900	155	510
1972	3,080	10,850	185	685
1973	4,700	15,300	235	900
1974	7,500	22,300	300	1,170
1975	11,800	32,300	355	1,480

time is up; RCA, of course, gets guaranteed revenue from the particular account. The most important announcement that can come from RCA during the next year or so will be details of its full-fledged entry into the international marketplace. This is considered not a matter of if, but of when, since multinational operations are a must to long-range success in the computer business.

CDC, off almost 20% in shipments during 1970, had the worst performance of any mainframe manufacturer. And the accompanying red ink in its computer operations illustrates the company's lack of a substantial rental base and, thus, its heavy dependence on outright sales for revenues. Shipments of just over $200 mil-

TABLE III

GENERAL PURPOSE COMPUTER MARKET (GROUP A)
(U.S. BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
		WORLDWIDE		
1969	13,400	70,400	6,820	29.5
1970	11,610	78,400	6,760	35.0
1971	20,100	95,100	7,685	41.3
1972	23,800	114,400	8,970	48.8
1973	27,700	136,500	10,105	57.2
1974	30,100	161,100	11,120	66.5
1975	35,800	189,500	12,310	76.6
		UNITED STATES		
1969	8,450	46,500	4,555	20.8
1970	5,300	48,600	3,970	23.8
1971	10,300	56,200	4,325	27.0
1972	12,270	65,000	4,985	30.8
1973	13,700	74,500	5,380	34.9
1974	14,200	85,100	5,900	39.4
1975	17,750	97,500	6,575	44.4
		INTERNATIONAL		
1969	4,980	23,900	2,265	8.7
1970	6,310	29,800	2,790	11.2
1971	9,800	38,900	3,360	14.4
1972	11,530	49,400	3,985	18.1
1973	14,000	62,000	4,725	22.4
1974	15,900	76,000	5,220	27.1
1975	18,050	92,000	5,735	32.3

lion were composed primarily of 6400s and 6600s, although quite a few 3300s went to customers outside the U.S.

International shipments were up substantially last year, but they were from a small base and not nearly substantial enough to offset an almost halving of U.S. business. In addition, CDC's sales of OEM peripherals were off, as other mainframe manufacturers such as Honeywell turned in-house for most if not all of their disk drives and the like. The market for independent peripherals was extremely good in 1970 (page 11), but CDC did not have the end-user marketing organization to take advantage. It has announced a shift of emphasis in this direction.

There is enthusiasm in some quarters that Star -- the superscale string array processor -- will be CDC's salvation. One or two of the computers are on order, and there is talk that General Motors and a few other large companies will soon be signing up. But, without extensive general-purpose software for the giant computer, CDC can hardly expect sales of even 10 or 12 Stars, scarcely enough to sustain its position in the computer industry. And a new product line does not appear near, but business enhancements for the 6000 series are expected this month.

To be successful over the long term, it would seem, CDC needs an effective entry into commercial computing so that it can build up a rental base. For several years it has had the resources to develop such a capability, but corporate commitment in this direction has not been forthcoming, and 1971 shipments will at best be level. Prospects look best abroad, and even stronger international efforts could come from CDC's study consortium with ICL and CII.

Digital Equipment moved solidly into the Number Eight spot among manufacturers during 1970, exceeding XDS in shipments for the second straight year and thereby pulling level in value of installed base. DEC's $100 million of 1970 shipments were up 34% over 1969. This 1.4% of shipments is almost three times the 0.5% rate DEC attained only two years earlier. The company ships the lowest portion of its output of any company in the international market, but this percentage is growing slowly. During 1970 it moved up a couple of points to just over 20%.

During 1970, however, the mixture of DEC's shipments shifted considerably. As shipments of the time-sharing PDP-10 peaked last summer, DEC's computer business was more highly concentrated in the minicomputer business than ever before. It is still the dominant minimanufacturer, with 40% of the installed base and 40% of last year's shipments. Also, continuing along a course charted about a year ago, DEC seems really committed to becoming a total systems supplier. To this end, quite an array of peripherals were announced at last year's Fall Joint, and more are known to be in the works. Shipments for calendar 1971 should be up another 20% to 30%, with perhaps another slight shift upward in the international portion of its mix.

XDS, for the first time in nine years, showed a loss on its computer operations during 1970. Shipments of just over $60 million were 13% below the 1968-1969 level, and less than 1% of the industry total. The company's problems are parallel to, though smaller than, those of Control Data: It has always had excellent hardware with good price/performance, but software has been weak; it has stressed purchases rather than rentals, and relies heavily on market sectors related to Federal spending.

The Sigma 6 and 9 computers, announced during 1970, appear to be simply price/performance imporvements of the Sigma 5 and 7 rather than a significant entry into the business data processing marketplace. A move in this direction has been anticipated since Xerox acquired SDS in March 1969, as were changes in management direction. Little happened on this front until quite late in 1970 when the year's results were predictable and obviously going to be bad. Recent cutbacks in work force look like a quiet retrenchment aimed at restoring at least a breakeven situation. The biggest development expected for 1971, in fact, is a return to profitability.

Other computer manufacturers, for all intents and purposes, means minicomputer manufacturers, and their results are counted as part of the dedicated application computer market. This industry sector includes special computers such as process control systems, but with shipments in this area apparently awaiting the impetus of IBM's System/7, this category is almost entirely minicomputers with CPs priced below $25,000.

During 1970, approximately 11,000 minis -- up some 80% over 1969 -- were shipped by U.S.-based manufacturers. The value of the shipment increase, however, was only 25% because there was a decided shift away from the $40,000 or $50,000 system and toward OEM shipment of CPUs only. These are typically worth $10,000 to $20,000. This trend should continue during 1971, with the number of shipments increasing another 45% to about 16,000, but the value going up only 20%.

As mentioned above, Digital Equipment is still the leader in the minicomputer marketplace, with about 40% of total installations and of shipments last year. Hewlett Packard shipped over 10% of the minis last year, bringing its installed base above that of Honeywell in number. Honeywell pretty much held its own and remains one of the major mini manufacturers. Other companies with shipments that exceeded their percentage of the installed base were Varian, Data General, General Automation Inc., Interdata, and Computer Automation Inc. Newcomers into the computer business -- such as Lockheed and Micro Systems Technology -- shipped well over 100 units each and poked their head above the large number of other manufacturers with very limited production.

All of the 60 or so other manufacturers of decidated application computers (excluding major mainframers as well as those listed above) shipped almost 15% of the total number of systems last year, but they actually accounted for about 30% of the Group B installed base. Concentration is definitely going on, and during the next few years there are likely to be dropouts of minicomputer manufacturers.

Almost all the dedicated application computer business today is on a purchase basis, and shipments represent revenues to the manufacturers. As IBM enters this marketplace with its System/7, however, it will introduce the rental concept to the world of the small computer. This could put pressure on other manufacturers to rent their product, even though the System/7 is more of a system component than a stand-alone minicomputer. If such pressure is applied, it could mean that most minimanufacturers will have to find the capital to finance a rental base, but also would mean that this portion of the computer marketplace would begin to look more like the general-purpose sector -- rental based and therefore less subject to rapid revenue fluctuations.

Independent peripheral shipments, up a little over 30% last year, should continue to increase at a healthy rate this year as users realize that plug-compatible units offer equivalent or better performance at a lower price. The tightened budgets of 1970, in fact, acted as a definite boon to the independents. Many users were told, essentially: "Do the same volume of work, but with less money." And rather than fire their own staff, they turned to equivalent but less expensive equipment. This trend will continue to some extent, but the course will be a little tougher for the independents because IBM felt the pinch, and has reacted.

The last six months or so give a perfect illustration of what can happen when IBM is pinched, as it were. IBM seems to have a threshold of pain at about the 8% to 10% outside penetration level, so when independent shipments of 2314-type disk drives spurted from nothing to nearly the 6% level during the last six months of 1970, IBM made a bold move. It announced that its 2314 drives would be available -- as the 2319 -- in clusters of three spindles at lower per/spindle prices. Similarly, the new 3400 series tape drives represent an effective price reduction.

As a result of these moves by IBM, the independent peripheral manufacturers were forced to cut their own prices if they wished to continue with a competitive edge. And this price erosion, in most cases, implied profit erosion. As a result,

TABLE V -- TOTAL WORLDWIDE REVENUE
ESTIMATED & PROJECTED REVENUE TO AMERICAN-BASED COMPANIES FROM KEY SECTORS OF THE EDP INDUSTRY
($ Millions)

	General Purpose Computers	Dedicated Application Computers +	Independent Peripheral Equipment *	Data Processing Supplies =	Computing & Data Processing Services	Contract & Packaged Software	Total
1961	845	20	90	485	180		1,620
1962	1,210	35	115	530	220		2,110
1963	1,760	60	130	595	265	5	2,815
1964	2,220	105	140	630	295	20	3,410
1965	2,670	120	150	660	355	50	4,005
1966	3,440	145	180	740	425	100	5,030
1967	4,620	220	270	850	530	175	6,665
1968	6,110	315	360	960	715	270	8,730
1969	6,780	430	435	1,075	940	450	10,110
1970	7,625	525	570	1,170	1,235	535	11,660
1971	9,010	630	720	1,325	1,500	550	13,735
1972	10,965	745	890	1,490	1,810	660	16,560
1973	12,780	880	1,070	1,650	2,250	790	19,420
1974	15,000	1,025	1,250	1,825	2,530	930	22,560
1975	17,000	1,190	1,440	2,010	2,960	1,085	25,685

+ Through 1970, virtually all Dedicated Application (Group B -- see page 15) computers were purchased by the user, and scrappage rates have been low. This trend should continue until 1972, when there will be volume shipments of IBM's System/7, which will be offered on a rental basis. Since user attitudes and actions cannot yet be determined, EDP/IR has considered Group B annual shipments as revenues.

* Independent peripheral equipment is supplied in a variety of ways: Some is sold directly to the end user, some is rented, and a substantial portion is supplied at OEM prices to other manufacturers or to third-party leasing companies for rental to the end user. There will be an increasing trend toward rentals, but data is not yet available, so in this table EDP/IR has considered annual shipments, at list price, as revenues.

= About 20% of the supplies business is in magnetic tape and disk packs, some of which are rented to customers. Since this is only a small portion of the total supplies business, all shipments have been counted as revenues.

some independents will be squeezed rather hard. The ones that continue to thrive will probably be those with a broad line of equipment that they can continue to sell at the national account level, offering virtually a total package of peripherals at a small discount under IBM, rather than specializing in a particular unit and underpricing it substantially.

Supplies revenues of almost $1.2 billion were up only 9% over 1970, but the expectations for 1971 and beyond are for a more normal 12% to 13% yearly growth. Some 80% of this business is still in punched cards or paper, with sales of magnetic tape and disk packs accounting for about $200 million in revenues, primarily to IBM, Memorex, and 3M. The market for 2314/2319-type disk packs will continue to grow, and a new market for 3330 disk packs should open up once significant deliveries of this new drive start next year.

Service bureaus and time sharing were the largest non-hardware growth area last year, with revenues up 27% despite the failure of many time-sharing companies. Those that survived have a fairly good outlook, because there are still many companies that can't justify their own computer but that have increasing data processing requirements. The local batch processing portion of this industry sector is by far the largest, with over $900 million in revenues in 1970 and expected to grow to over $1.1 billion this year. The smaller components of this sector -- remote batch, conversational time sharing, and computer information services -- will grow over 30% to nearly $400 million during 1971, giving this area the second highest growth rate among all the computer industry sectors.

Software, as Table V shows, will grow very little this year as a total sector. This is because there are extreme variations within the general category. Revenues from manpower services (system engineer time, to use IBM parlance) will increase about 15% during 1971 and revenues from standard software packages is expected to rise about 65% to over $80 million. Contract programming for systems such as airline reservations will be down a little, however, and equipment manufacturer subcontracts will be off significantly this year. As a result, only minimal growth is expected and total software revenues for 1971 should be in the $550 million range.

Leasing revenues are not included in the table because it represents primarily payments by users for equipment already purchased from the manufacturer. The third-party leasing industry ceased making major new purchases last year, dropping from an estimated $1.4 billion in new purchases in 1968 to about $300 million, primarily of add-on equipment, last year. Purchases this year should be no more than $150 million as leasing companies buy equipment only when necessary to satisfy customers of their third-generation equipment. Leasing company revenues, however, should increase about 9% to the $650 million level as equipment stays out and last year's placements contribute a full year of payments. With IBM's System/370 equipment unattractive to leasing companies, the outlook is for revenue increases of 9% to 10% a year, and many of the companies are looking for ways to diversify. A few are developing into broader-based suppliers, offering independent peripherals and setting up services such as time-sharing operations.

Education revenues grew about 40% from a small base in 1970, and should experience another 20% growth to about the $200 million level this year. Some of this money is spent by individuals preparing themselves for better jobs, some is paid out by employers to train their staff. IBM will benefit from the latter type as users train their operators and programmers on their new 370s. Accompanying this, however, will be a significant shift to in-house education as users send only a few personnel to school, then have them train other employees.

TABLE VI

HISTORICAL REVIEW OF WORLDWIDE COMPUTER ACTIVITY
BY U.S.-BASED MANUFACTURERS
(Values, in $Millions, calculated as new purchase price)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
1955	150	250	65	0.18
1956	600	800	170	0.34
1957	1,000	1,700	280	0.60
1958	1,400	2,950	460	1.03
1959	1,700	4,500	600	1.60
1960	2,200	6,500	720	2.27
1961	3,400	9,300	1,100	3.26
1962	4,500	12,600	1,400	4.51
1963	5,600	16,800	1,710	5.97
1964	7,500	24,000	2,200	7.92
1965	7,400	31,000	2,400	11.1
1966	10,200	40,600	3,900	14.3
1967	18,700	57,600	5,350	18.9
1968	14,700	69,400	6,710	24.5

TABLE VI (above) is repeated so that the reader will have historical data for reference and comparison with the projections in this issue. A few figures have been modified slightly on the basis of recent information, so care should be taken when comparing these figures with others published previously. Because of space limitations, these historical figures are not presented in their U.S. and international components. For such information, the reader is referred to the 1970 Review and Forecast issue, published on March 12, 1970.

Also, it should be noted that, because of Census changes introduced in the Nov. 28, 1969 issue of EDP/IR, the totals in Table VI cannot be compared directly with current estimates and projections. The EDP/IR Census today consists of a General Purpose Census (Group A -- see pages 18 and 19) and a Dedicated Application Census (Group B -- see pages 15 through 17). The new Census includes all computers summarized above, but also includes a number of Group B machines (primarily minicomputers) that were not reported during most of the 1960s.

This change in reporting had little effect on the total value of computers installed -- only about $250 million worth of computers would be added to the almost $25 billion reported in use at yearend 1968. In other words, the 1968 worldwide total for all computers produced by U.S. suppliers was understated by about 1%, well within the margin for error. In terms of numbers of computers, however, the story is different. Minicomputers (included in the Group B totals) are now being shipped at a rapid rate, and the "Cumulative number in use" figure shown above is about 10,000 units smaller than it would be if these computers were included in the totals.

DEDICATED APPLICATION DIGITAL COMPUTER CENSUS

The data listed below for Dedicated Application General Purpose Computers (Group B) is based on the best information available to the International Data Corporation, and much of it has been verified by the manufacturers. Comments or corrections should be directed to EDP/IR's census editor.

Group B computers, for the purposes of this Census, are defined as those commonly called minicomputers as well as certain larger systems usually designed or used for one dedicated application such as process control, data acquisition, or the like. These computers are word oriented, usually purchased, and predominately programmed in assembly language. They have been grouped as follows:

Class	Average System Purchase Price	No. of Models Currently Marketed
1	$ 1 - $24,999	64
2	$ 25,000 - $49,999	35
3	$ 50,000 - $99,999	24
4	$100,000 - Above	22

Some of the companies in this Census do not actually manufacture computers; rather, they buy processors from an Original Equipment Manufacturer and market them as shown. These firms are identified with an asterisk (*).

AS OF JANUARY 1, 1971

NAME OF MANUFACTURER	COMPUTER MODEL	NOTES	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
*Astrodata	ADAC	a	12	1	4	9	8/70	3	0	3	3
Atron	501		8	2	8	35	9/69	65	0	65	NA
Autonetics	Recomp-II		40	4	95	127	11/58	20	5	25	X
	Recomp-III		40	3	65	94	6/61	7	2	9	X
Bailey Meter	755		25	4	80	110	11/61	32	3	35	X
	756		25	4	90	180	2/65	14	6	20	X
	855/25		25	4	100	400	12/68	8	0	8	17
*Beckman Instruments	82		12	3	32	62	8/67	37	9	46	
BIT	480		8	1	6	7	12/66	195	3	198	X
	483		8+1	1	8	10	1/70	90	32	122	480
Cascade Data Computer	80/20		8	2	29	35	6/70	4	0	4	NA
	80/30		8	2	32	40	1/70	17	0	17	NA
Cincinnati Milacron	CIP/2000	b	8/9	1	2	4	12/69	NA	NA	NA	211
	CIP/2100	b	8/9	1	5	7	7/69	NA	NA	NA	11
	CIP/2110				5						
	CIP/4000		18+2								
Clary Datacomp	404		16	1	12	25	11/69	20	10	30	350
Collins Radio	8400			4		950	11/62	25	5	30	X
	8500		32	4	200	1000	1/67	49	13	62	7
Comcet	10			1		17	6/69	21	0	21	NA
	20		8	3		80	/70	2	0	2	75
	40		8	4		270	6/69	10	0	10	NA
	60		8	4		370	6/69	11	0	11	NA
Compiler Systems, Inc.	CSI-16		16	2	11	50	11/70	20	0	20	80
	CSI-24		24	3	15	75	11/70				30
Computer Automation Inc.	108		8	1	5	8	1/71	-	-	-	20
	208		8	1	5	8	8/69	]	]		20
	808	c	8	1	5	8	4/68	] 140	] 10	] 150	70
	116		16	1	8	11	8/70	0	15	15]	
	216		16	1	8	11	7/69	130	10	140]	225
	816		16	1	10	12	12/68	40	5	45]	
Computer Development	CD-200		8	1	7		8/70				
*Computer Logic	CLS-18		18	1	10	14	2/71	-	-	-	NA
Computer Signal Processors	CSP-30		16	3	85	100	6/70	6	0	6	3
Control Data Corp.	160		12	4	60	112	5/60	49	11	60	X
	160-A		12	4	90	225	7/61	200	65	265	X
	160-G		13	4		535	3/64	35	0	35	X
	924/A		24	4		430	8/61	26	1	27	X
	1700		16+2	4	37	170	4/66	290	75	365	30
	8090		12	3		96	5/64	116	89	205	X
	8092		8	3		67	6/64	60	0	60	X
	G-15		29	3		61	7/55	265	18	283	X
	LGP-21		32	2		42	12/62	140	13	153	X
	LGP-30		32	3	49	59	9/56	290	43	333	X
	RPC-4000		32	4	87	101	10/60	61	12	73	X
	CSC-46		21	4		250	/54	10	0	10	X
	CSC-136		25	4		275	/60	4	1	5	X
	CSC-636		15	4		300	10/63	13	2	15	X
	Subtotal							1559	330	1889	30
Datacraft	6024-1	d	24	4	51	180	5/69	11	0	11	3
	6024-3		24	3	33	75	2/70	26	1	27	58
Data General Corp.	Nova		16	1	8	11	2/69	675	75	750	700
	Nova-800		16	1	7		4/71	-	-	-	
	Nova-1200		16	1	5		2/71	-	-	-	
	Super Nova	e	16	1	10		4/70	80	0	80	200
	Super Nova-DC		16	1	12		6/71				
Datamate Computer Systems	DM-16		16	2	15	26	11/69	10	0	10	2
	DM-70		16	1	9	15	8/70	5	0	5	9
	DM-70/ROM		16	1	4	6	8/70				
	ECP-18		18	1	14	15	11/66	21	0	21	X
*Data Processing International	DPI-500	a	12	3	50	70	7/69	12	0	12	25
Digiac Corp.	3080		25	1	20	25	12/64	14	0	14	X
	3080-C		25	2	26	30	10/67	5	0	5	1
Digital Computer Controls	D-112	f	12	1	4	10	7/70	35	5	40	300
Digital Equipment Corp.	PDP-1		18	4	120	136	11/60	48	2	50	X
	PDP-4		18	3		74	8/62	31	5	36	X
	PDP-5		12	2	30	36	9/63	73	10	83	X
	PDP-7		18	3		66	11/64	76	24	100	X
	PDP-8		12	1	18	24	5/65	1185	255	1440	X
	PDP-8/E		12	1	3	10	4/71	-	-	-	NA
	PDP-8/I		12	2	13	25	3/68	2760	940	3700	200
	PDP-8/L		12	1	8	20	10/68	3320	580	3900	250
	PDP-8/S		12	1	10	18	9/66	840	185	1025	X
	PDP-9		18	3	35	70	12/66	305	131	436	X
	PDP-9/L		18	2	20	33	11/68	34	14	48	15
	PDP-11		16	1	11	15	4/70	430	115	545	200
	PDP-12		12	2	15	35	4/69	380	95	475	150
	PDP-15		18	3	16	55	2/70	292	85	377	150
	Linc-8		12	2	38	48	9/66	94	40	134	X
	Subtotal							9868	2481	12,349	965
Digital Scientific Corp.	ETA-4		16	3	9	125	4/70	27	0	27	250

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NAME OF MANUFACTURER	COMPUTER MODEL	NOTES	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
EMR Computer	210		21	4	94	132	4/62	9	0	9	X
	420		42	4	324	450	6/63	3	0	3	X
	2100		21	4	65	143	12/63	8	0	8	X
	6020		24	4	72	176	4/65	15	2	17	X
	6040		24	4	98	224	7/65	10	1	11	X
	6050		24	4	123	360	2/66	19	6	25	X
	6070		24	4	240	600	10/65	1	2	3	X
	6130/6135		18	3	39	62	10/67	53	10	63	10
	6120		16		8		7/70				
Elbit Computer Ltd.	100		12	1	5		1/68	5	200	205	50
Electronic Associates Inc.	640		16	2	25	50	6/67	95	45	140	X
	1020		16	2		25	2/64	100	25	125	X
	8400		32	4		400	6/65	19	6	25	X
*Electronic Engineering Company of California	EECO-1600	g	16	3		100	5/70	1	1	2	3
Electronic Processors	EPI-118										
Foto-Mem, Inc.	Centauer-100		8/16	1	6	16	4/70	11	0	11	90
Four Phase Systems	IV/70		18		6		2/71				
GRI Computer Corp.	909	h	16	1	4	9	1/70	65	8	73	300
General Automation Inc.	GA-18/30		16	2	19	50	7/69	25	0	25	25
	SPC-12		8	1	4	17	1/68	550	50	600	150
	SPC-16		16	1	12	25	5/70	30	0	30	15
General Electric Co. GE/PAC	30	i	8	1	11	25	5/69	65	5	70	35
	312		20	4		200	3/60	27	6	33	X
	412		20	4		300	7/62	39	8	47	X
	3010		16	4	13	160	5/70	2	0	2	8
	4010		24	4	76	200	10/70	2	0	2	16
	4020		24	4	79	240	2/67	172	49	221	59
	4040		24	4		120	8/64	45	20	65	X
	4050		24	4		280	12/66	23	2	25	X
	4060		24	4		340	6/65	18	2	20	X
Hewlett Packard Co.	2000-A	j	16	3	89	101	11/68	149	62	211	13
	2000-B	k	16	4	119	134	8/70	3	1	4	4
	2000-C		16	4	187	205	3/71				11
	2005-A	l	16	3	72	85	6/69	25	5	30	5
	2007-A	m	16	1	20	20	9/68	41	11	52	4
	2114-A		16	1	10	16	10/68	419	119	538	X
	2114-B		16	1	9	15	11/69	429	108	537	53
	2114-C		16	1	9	15	4/71	-	-	-	NA
	2115-A		16	2	15	26	11/67	267	65	332	6
	2116-A		16	2	22	32	11/66	85	15	100	X
	2116-B		16	2	24	40	9/68	623	156	779	7
	2116-C		16	2	20	45	11/69	24	4	28	72
	Subtotal							2065	546	2611	175
Honeywell (CCD)	116		16	3		65	4/68	172	35	207	X
	316		16	2	8	27	6/69	496	120	616	195
	416		16	2	17	43	4/67	198	130	328	X
	516		16	3	25	55	10/66	604	180	784	25
	19		19	4		140	5/61	3	0	3	X
	24		24	4		200	5/63	82	3	85	X
	124		24	4	65	130	3/66	109	15	124	X
	224		24	4	75	380	3/65	55	8	63	X
	324		24	4		400	7/68	6	0	6	X
	290		18	4		175	11/60	10	2	12	X
	610/620	n	24	4		180	9/63	22	6	28	X
	632		32	4	97	240	12/68	8	4	12	7
	1642	o	16	4	144		4/71	-	-	-	NA
	1644	o	16	4	192		4/71	-	-	-	NA
	1646	o	16	4	252		4/71	-	-	-	NA
	1648	p	16	4	375	440	12/69	14	3	17	6
	H-21		20	3		63	2/66	41	25	66	X
	Subtotal							1820	531	2351	233
IBM	1710/1720		6	4		225	2/67	82	33	115	X
	1800		16+2	4	47	235	2/66	860	285	1145	75
	System 7			2		37	11/71	-	-	-	NA
Imlac	PDS-1		16	1	10	11	2/70				
*Information Instruments	PDQ-II	q	8	3	6	72	4/70	25	0	25	10
Information Technology	4900/5		8	1	3	5	10/70				25
	4900/10		16	1	10	20	10/65	25	0	25	X
	4900/20		16/32	3	30	50	10/69	6	0	6	
Infotronics	Mini/max		16	2	17						
Interdata	1		8	1	4	11	9/70	5	1	6	70
	2		8	1	9	11	7/68	20	0	20	X
	3		16	1	11	20	5/67	240	20	260	X
	4		16	1	9	15	8/68	280	20	300	90
	5		16	2	11	25	7/70	9	1	10	30
	15		16	2	22	35	1/69	60	4	64	13
Interplex	System 1		16	2	47	47	9/70				
Lockheed Electronics Co.	MAC-16		16	1	13	22	2/70	285	20	305	145
	MAC-Jr		16	1	10		9/70				
Micro Systems Technology	800		8/9	1	3	8	1/69	108	23	131	NA
	810		8	1	6	10	1/69	189	2	191	NA
	812		8	1	11	15	12/69	16	0	16	NA
	820				7	8	10/70	4	0	4	NA
	400				4	4	10/70	8	0	8	NA
*Mini Comp	MD-708		8	1	5	7	6/70	10	0	10	100
	Administrator-2		16	3	35	52	12/70				
	Multi User-E		16	3	67	85	11/70				
	Multi User-I		16	3	40	58	1/71	-	-	-	

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NAME OF MANUFACTURER	COMPUTER MODEL	NOTES	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Modular Computer Systems	Modcomp-II		16	2	10	27	12/70				
	Modcomp-III		16	3	14	100	1/71	-	-	-	
Motorola Instrument and Control	MDP-1000		8	1	8	19	2/69	50	0	50	NA
Northwest Data Systems	803		16				8/69				
	804		16				8/69				
	903		16								
	904		16								
Nuclear Data	ND-812		24				1/71	-	-	-	
Omnicomp Computer Corp.	Omnus-1		16	1	5	12	4/71	-	-	-	NA
Qantel Corp.	Qantel-V		8	2	14	26	4/70	30	0	30	NA
Raytheon Computer	703		16	1	13	20	10/67	165	30	195	X
	704		16	1	11	18	4/70	39	10	49	12
	706		16+2	2	19	36	5/69	36	12	48	7
	PB-250		22	2	33	48	12/60	155	20	175	X
	PB-440		24	4		140	3/64	18	2	20	X
	PB-520		24	4		128	10/65	26	1	27	X
Redcor Corp.	RC-70	r	16	2	18	30	3/69	100	10	110	50
Rolm Corp.	1601		16	2	20	28	2/70	25	2	27	NA
Sanders	SANDAC-200	s	16	3	50	100	3/69	9	0	9	6
Scientific Control Corp.	600 Series		24	3	31	80	10/65	230	0	230	X
	4700		16	3	16	50	3/69	19	0	19	4
	DCT-132		8	2	28	30	5/69	40	14	54	15
Spear	Microlinc		12	3	46	57	6/66	33	3	36	X
Spiras Systems	65		16	1	10	20	8/69	20	0	20	NA
Systems Engineering Labs	810		16	2	38	45	9/65	24	0	24	X
	810-A		16+2	3	18	90	4/67	211	5	216	32
	810-B		16+2	4	30	150	12/68	75	1	76	26
	840		24	3	65	80	11/65	3	0	3	X
	840-A		24	3	60	75	8/66	36	2	38	X
	840-MP		24+2	4	49	250	12/67	33	0	33	X
	72		16								
	86		32	4	200	325	6/70				
	88		32	4	350	600	3/71	-	-	-	NA
	Multidata-A		16	2	15	40	6/70				15
Tempo Computers/GT&E	1		16	1	14	22	11/69	20	0	20	NA
Texas Instruments	960		16+1	2	18	30	6/70	18	0	18	NA
	980	t	16+1	2	10	40	8/70	10	0	10	NA
Time Zero Corp.	90	i	16	3	50	67					
Unicom, Inc.	CP-8A		8	1	2	2	2/70	20	1	21	50
	CP-8B		8	1	2	2	3/70	12	0	12	40
	CP-8C		8	1	3	4	3/70	18	2	20	75
	CP-8D		8	1	5	5	4/70	5	0	5	7
Unicomp, Inc.	Comp-16		16	2	11	27	6/70	7	0	7	8
	Comp-18		18	2	12	38	8/70	8	0	8	8
Varian	520/i	u	8	1	7	13	9/68	200	95	295	485
	610		12	1		15	7/64	10	0	10	X
	620		16	2		37	11/65	75	0	75	X
	620/i		16/18	1	10	20	9/67	1300	60	1360	175
	620/f		16	1	11	25	11/70	13	0	13	250
	R620/i		16/18	2	14	28	7/68	25	1	26	2
	R622/i		18	2	15	30	7/68	30	2	32	70
	Subtotal							1653	158	1811	982
*Varisystems	PAC-16	v	16	1	4		8/69	14	0	14	
Wang Labs, Inc.	3300		8	1	14	20	9/70	NA	0	NA	45
Westinghouse Electric Corp.	50		14	1	16	23	8/64	165	20	185	X
	250	w	16	3	40	62	9/67	115	13	128	30
	510/580		18	4	85	110	6/63	110	20	130	X
	2000		16	2	10	27	8/69	75	27	102	80
	2500		16	2	10	45	4/71	-	-	-	NA
Weismantel Associates	WAICOM-16		16	3		90	11/70				
Xerox Data Systems	92		12	3		90	4/65	42	8	50	X
	910		24	3		120	8/62	168	15	183	X
	920		24	4		150	9/62	111	19	130	X
	925		24	4		200	12/64	13	2	15	X
	930		24	4	80	400	6/64	112	18	130	X
	CE-16		16	1	8	13	5/69	11	0	11	8
	CF-16		16	1	15	25	12/69	25	0	25	15
	CF-16/A	y	16	1		17	11/70				25
	Sigma-2		16	4	24	125	12/66	210	40	250	X
	Sigma-3		16	4	24	140	1/70	80	20	100	45
	Subtotals							772	122	894	93
	TOTALS							25,257	5,414	30,671	

Notes: * CPU purchased OEM and marketed by company listed
X No longer marketed or manufactured
NA Information not available

a Version of DEC-PDP-8/L
b Manufactured under licensing by Micro Systems - 800
c used in Data Instrument - key to tape
d used in Singer-Micrographic (Link Division) MS-6000 COM systems
e used in Applications Unlimited - Shared Processor
f used in Computer Machinery Corp. - key to tape
g version of Data General - NOVA
h used in Advanced Digital Systems, Inc. - LCS/5 tape control system
i utilizes Interdata-4
j utilizes 2116-B
k utilizes 2114-B or 2116-B
l utilizes 2116-B (Real Time Executive System)
m utilizes 2115-A or B (Educational Basic System)
n version of XDS - 910/920
o utilizes 2-316
p utilizes 2-516 and 416
q version of Varian 620/i
r used in Penta - Key Logic System
s utilizes Varian 620i
t test 90 units used in-house for real-time process-control
u used by Burroughs as TC-500 terminal
v manufactured by Photon, Inc.
w version of XDS - Sigma 2
y version of CAI - 116

GENERAL PURPOSE COMPUTER CENSUS

Counts in the General Purpose Digital Computer (Group A) Census, shown below, are based on the best information available to the International Data Corporation, but are estimates. Computer manufacturers, as a rule, do not directly supply this type of information, and it is only through the use of IDC's extensive data files and other information sources that such estimates are possible. The computers included in "Group A" comprise the bulk of digital computers in operation. They are byte or character oriented -- with the exception of large-scale scientific machines -- and are primarily programmed with higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and specialized-purpose machines.

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NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	205	$ 4,600	1/54	1	11	12	X
	220	$ 14,000	1/58	9	2	11	X
	B-100 Series	$ 3,300	8/64	13	6	19	X
	B-200 Series	$ 6,500	11/61	246	135	381	X
	B-300 Series	$ 8,000	7/65	510	98	608	X
	B-500	$ 3,800	11/68	294	244	538	65
	B-2500	$ 6,500	2/67	177	69	246	45
	B-3500	$ 14,700	5/67	296	150	446	75
	B-4500	$ 29,000	11/71	-	-	-	30
	B-5500	$ 33,500	3/63	139	39	178	X
	B-5700	$ 27,000	12/70	1	0	1	30
	B-6500	$ 70,000	11/69	16	14	30	6
	B-6700	$ 67,000	2/71	-	-	-	30
	B-7700	$120,000	2/72	-	-	-	2
	B-8500	$200,000	4/69	1	0	1	X
	Subtotal			1703	768	2471	283
Computer Operations Inc.	Gemini	$225,000	6/71	-	-	-	1
Control Data Corp.	G-20	$ 19,600	4/61	6	10	16	X
	1604/A/B	$ 42,000	1/60	32	5	37	X
	31/3150	$ 10,500	12/64	106	52	158	13
	3170	$ 16,700	12/70	1	0	1	9
	3200	$ 14,000	5/64	61	45	106	X
	3300	$ 20,500	9/65	128	96	224	18
	3400	$ 23,700	11/64	4	12	16	X
	3500	$ 25,000	1/69	3	11	14	4
	3600	$ 48,000	6/63	26	19	45	X
	3800	$ 53,000	12/65	12	5	17	X
	6200	$ 39,000	11/70	2	0	2	4
	6400	$ 55,300	5/66	60	27	87	10
	6500	$ 65,500	12/67	15	2	17	4
	6600	$127,000	8/64	66	27	93	7
	6700	$137,000	7/70	2	0	2	4
	7600	$190,000	1/69	4	0	4	3
	Subtotal			528	311	839	76
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	17	6	23	X
	PDP-10	$ 13,500	10/67	120	47	167	10
	Subtotal			137	53	190	10
Friden	System-10	$ 1,400	10/70	6	0	6	45
Honeywell Information Systems	G-5X Series	$ 1,400	1/66	50	1360	1410	160
	G-105	$ 1,350	3/69	17	45	62	20
	G-115	$ 2,500	4/66	257	1390	1647	80
	G-120	$ 3,200	1/70	14	65	79	40
	G-130	$ 4,400	10/69	2	55	57	15
	G-205	$ 2,900	6/64	5	0	5	X
	G-210	$ 16,000	3/60	23	0	23	X
	G-215	$ 6,000	9/63	7	0	7	X
	G-225/255	$ 8,500	4/61-10/67	140	23	163	X
	G-235/265	$ 14,500	4/64-10/65	100	19	119	X
	G-245/275	$ 18,000	10/69	2	1	3	X
	G-405/410	$ 7,200	2/68-11/69	27	2	29	5
	G-415/420	$ 7,600	5/64- 6/67	182	234	416	X
	G-425/430	$ 13,200	6/64- 6/69	64	80	144	X
	G-435/440	$ 14,800	9/65- 7/69	38	19	57	5
	G-605	$ 25,000		3	2	5	X
	G-615	$ 55,000	6/69	13	7	20	7
	G-625	$ 65,000	4/65	1	4	5	X
	G-635	$ 80,000	5/65	75	14	89	4
	G-645	$120,000	7/66	4	0	4	X
	G-655	$ 90,000	1/71	-	-	-	10
	H-110	$ 3,200	9/68	170	84	254	45
	H-115	$ 4,000	3/70	215	80	295	280
	H-115/2	$ 5,060	1/71	-	-	-	NA
	H-120	$ 5,000	1/66	700	400	1100	X
	H-125	$ 7,400	12/67	150	200	350	35
	H-200	$ 7,600	3/64	645	345	990	X
	H-1015	$ 8,400	4/71	-	-	-	NA
	H-12/1250	$ 10,500	2/66- 8/68	380	146	526	35
	H-2015	$ 12,800	2/71	-	-	-	NA
	H-2200	$ 19,600	1/66	110	75	185	12
	H-3200	$ 23,000	2/70	33	12	45	24
	H-4200	$ 28,500	9/68	23	6	29	6
	H-8200	$ 50,000	2/69	14	2	16	6
	H-400	$ 10,600	12/61	46	31	77	X
	H-1400	$ 14,000	1/64	4	6	10	X
	H-800	$ 26,000	12/60	58	13	71	X
	H-1800	$ 46,000	1/64	14	2	16	X
	Subtotal			3586	4722	8308	789

AS OF JANUARY 1, 1971

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
IBM	System-3/6	$ 1,015	12/70	5	0	5	700
	System-3/10	$ 1,400	1/70	1570	80	1650	6700
	360/20	$ 4,200	12/65	8450	4870	13,320	900
	360/25	$ 8,000	10/68	2040	740	2780	640
	360/30	$ 12,300	6/65	7270	3200	10,470	200
	360/40	$ 22,000	5/65	3580	1880	5460	330
	370/145	$ 22,500	8/71	-	-	-	930
	360/44	$ 13,800	7/66	140	100	240	15
	360/50	$ 36,500	8/65	1420	605	2025	120
	370/155	$ 48,000	2/71	-	-	-	750
	360/65	$ 69,000	11/65	660	205	865	60
	370/165	$ 90,000	4/71	-	-	-	285
	360/67	$138,000	6/66	58	8	66	5
	360/75	$ 84,400	1/66	53	22	75	5
	360/85	$155,000	10/69	13	3	16	6
	360/9X	$150,000	11/67	13	7	20	X
	360/195	$232,000	3/71	-	-	-	16
	1130	$ 2,100	2/66	3350	1550	4900	120
	305	$ 3,600	12/57	2	22	24	X
	650	$ 4,800	12/54	8	36	44	X
	1401	$ 6,200	9/60	1810	1830	3640	X
	1401-G	$ 2,300	5/64	270	70	340	X
	1401-H	$ 1,300	6/67	80	20	100	X
	1410	$ 17,000	11/61	180	115	295	X
	1440	$ 4,100	4/63	615	500	1115	X
	1460	$ 9,800	10/63	130	60	190	X
	1620	$ 4,000	9/60	440	260	700	X
	7010	$ 26,000	10/63	39	12	51	X
	7030	$160,000	5/61	6	2	8	X
	704	$ 32,000	12/55	6	4	10	X
	7040	$ 25,000	6/63	32	27	59	X
	7044	$ 36,500	6/63	30	21	51	X
	705	$ 38,000	1/56	19	10	29	X
	7070/74	$ 27,000	3/60-2/61	176	57	233	X
	7080	$ 60,000	8/61	72	1	73	X
	7090	$ 63,500	6/60	28	27	55	X
	7094	$ 73,400	9/62	92	10	102	X
	7094-II	$ 79,400	4/64	24	0	24	X
	Subtotal			32,681	16,354	49,035	11,782
NCR	Century-50	$ 1,650	2/71	-	-	-	NA
	Century-100	$ 2,600	9/68	1250	325	1,575	350
	Century-200	$ 7,700	6/69	400	100	500	250
	Century-300	$ 20,000	2/72	-	-	-	25
	304	$ 10,000	1/60	17	2	19	X
	310	$ 1,000	5/61	17	3	20	X
	315	$ 7,000	5/62	437	318	755	X
	315-RMC	$ 9,000	9/65	125	50	175	17
	390	$ 800	5/61	350	500	850	X
	500	$ 1,000	10/65	1100	1550	2650	130
	Subtotal			3696	2848	6544	772
Philco	1000	$ 7,000	6/63	13	1	14	X
	210/211	$ 40,000	10/58	12	1	13	X
	212	$ 52,000	1/63	12	1	13	X
	Subtotal			37	3	40	
RCA	2	$ 14,600	7/71	-	-	-	33
	3	$ 19,600	10/71	-	-	-	26
	6	$ 29,900	10/71	-	-	-	17
	7	$ 40,100	10/71	-	-	-	14
	Spectra 70/15	$ 5,100	9/65	45	160	205	X
	Spectra 70/25	$ 7,900	9/65	15	73	88	X
	Spectra 70/35	$ 13,600	1/67	155	240	395	38
	Spectra 70/45	$ 23,100	11/65	310	210	520	44
	Spectra 70/46	$ 40,200	11/68	35	3	38	13
	Spectra 70/55	$ 41,600	11/66	20	17	37	6
	Spectra 70/60	$ 43,100	9/70	6	1	7	9
	Spectra 70/61	$ 55,000	3/71	-	-	-	5
	301	$ 9,500	2/61	340	23	363	X
	3301	$ 25,000	7/64	70	1	71	X
	501	$ 17,000	6/59	70	4	74	X
	601	$ 50,000	11/62	5	0	5	X
	Subtotal			1071	732	1803	205
Standard Computer Corp.	IC-4000	$ 9,000	9/68	16	0	16	X
	IC-6000	$ 16,000	5/67	9	0	9	X
	IC-7000	$ 17,000	6/69	16	0	16	3
	Subtotal			41	0	41	3
Univac	I/II	$ 25,000	3/51-11/57	13	3	16	X
	III	$ 25,400	8/62	48	46	94	X
	SS-80/90	$ 8,000	8/58	69	74	143	X
	418-I/II	$ 13,700	6/63- 9/64	100	117	217	X
	418-III	$ 19,600	7/69	21	25	46	15
	491/492	$ 27,000	12/61	40	27	67	X
	494	$ 41,400	2/66	65	32	97	10
	1004	$ 1,900	2/63	1175	1570	2745	X
	1005	$ 2,550	4/66	765	190	955	X
	1050	$ 8,800	9/63	212	165	377	X
	1103/1105	$ 35,000	12/50-9/58	8	3	11	X
	1106	$ 40,000	12/69	20	21	41	31
	1107	$ 57,000	10/62	21	23	44	X
	1108	$ 68,000	9/65	137	92	229	22
	1110	$ 79,000	11/71	-	-	-	3
	9200	$ 1,700	6/67	1225	640	1865	265
	9300	$ 4,000	9/67	665	760	1425	220
	9400	$ 10,000	5/69	49	138	187	90
	LARC	$135,000	5/60	1	0	1	X
	Subtotal			4634	3926	8560	656
Xerox Data Systems	Sigma-5	$ 11,500	8/67	150	50	200	20
	Sigma-6	$ 20,000	11/70	3	0	3	15
	Sigma-7	$ 24,000	12/66	92	28	120	10
	Sigma-9	$ 44,000	9/71	-	-	-	NA
	940	$ 24,000	4/66	42	8	50	X
	9300	$ 8,500	11/64	39	6	45	X
	Subtotal			326	92	418	45
	TOTALS			48,446	29,809	78,255	14,667

ANNUAL COMPUTER STOCK SUMMARY

The following table summarizes computer stock price activity for both calendar 1970 (Jan. 2 to Dec. 31, 1970) and the past year (Feb. 27, 1970 to Feb. 26, 1971). The list differs slightly from that previously carried on a regular basis so that the table will include the leading computer field companies except for some large conglomerates whose computer-related business is small relative to total sales.

	Last Twelve Months					Calendar 1970				
	70-71 High	70-71 Low	Feb.26,1971 Close	One Year Net Change	One Year % Change	1970 High	1970 Low	Dec.31,1971 Close	1970 Net Change	1970 % Change
NEW YORK EXCHANGE										
Address.-Mult.	62	20	30	- 14	- 32%	62	20	27	- 33	- 55%
American R&D	100	37	53	- 36	- 40	100	37	47	- 37	- 44
Ampex Corp.	49	13	19	- 20	- 51	49	13	18	- 30	- 63
Automatic DP	53	24	52	+ 5	+ 11	50	24	45	+ 2	+ 5
Bunker Ramo	15	6	12	- 1	- 8	15	6	10	- 4	- 29
Burroughs	173	79	108	- 41	- 28	173	79	109	- 50	- 31
Collins Radio	37	9	16	- 9	- 36	37	9	15	- 21	- 58
Computer Sciences	34	5	12	- 13	- 52	34	5	10	- 24	- 71
Control Data	123	29	58	- 7	- 11	123	29	51	- 68	- 57
DPF&G	32	7	14	- 8	- 36	32	7	12	- 19	- 61
Digital Equipment	124	49	67	- 46	- 41	124	49	57	- 48	- 46
Electronic Assoc.	12	4	7	- 1	- 13	12	4	5	- 6	- 55
Electronic Mem.	40	6	10	+ 2	+ 25	40	6	9	- 30	- 77
Honeywell	152	66	98	- 41	- 29	152	66	83	- 61	- 42
IBM	387	219	337	- 3	- 1	387	219	318	- 47	- 13
ITT	60	31	55	- 4	- 7	60	31	51	- 9	- 15
Leasco	31	7	19	--	--	31	7	16	- 14	- 47
Memorex	167	45	58	- 76	- 57	167	45	57	- 91	- 61
Mohawk Data Sci.	87	18	30	- 47	- 61	87	18	26	- 47	- 64
National Cash Reg.	63	29	39	-107	- 73	63	29	39	-122	- 76
RCA	35	18	31	+ 1	+ 3	35	18	27	- 8	- 23
Raytheon	38	16	35	+ 6	+ 21	34	16	28	- 5	- 15
SCM	25	11	17	- 3	- 15	25	11	14	- 11	- 44
Sanders	30	7	17	- 2	- 11	30	7	13	- 14	- 52
Sangamo	29	9	18	- 7	- 28	26	17	15	- 11	- 42
Singer	86	53	71	- 8	- 10	86	53	65	- 20	- 24
Sperry Rand	40	19	31	- 7	- 18	40	19	26	- 11	- 30
Teledyne	40	13	26	- 1	- 4	40	13	24	- 16	- 40
Telex	26	9	16	-118	- 88	26	9	17	- 76	- 82
Univ'ty Comput.	99	13	24	- 36	- 60	99	13	22	- 75	- 77
Western Union	48	31	47	--	--	48	31	42	- 2	- 5
Xerox	116	65	96	+ 5	+ 5	116	65	87	- 18	- 17
AMERICAN EXCHANGE										
Applied Data Res.	24	4	12	+ 1	+ 9	24	4	5	- 19	- 79
CalComp	36	10	26	- 4	- 13	36	10	25	- 3	- 11
Comput. & Softw.	76	16	32	- 32	- 50	76	16	30	- 36	- 55
DPA, Inc.	10	3	6	- 1	- 14	10	3	4	- 6	- 60
Data Products	26	5	8	- 14	- 64	26	5	7	- 17	- 71
Greyhound Computer	14	5	9	- 4	- 31	14	5	7	- 7	- 50
ITEL	26	6	17	- 3	- 15	27	6	16	- 7	- 30
Levin-Townsend	19	3	6	- 6	- 50	19	3	5	- 14	- 74
Milgo Elect.	41	15	18	- 44	- 71	41	15	25	- 42	- 63
Potter Instrument	43	15	21	- 21	- 50	43	15	17	- 21	- 55
Systems Eng. Labs.	49	10	14	- 28	- 67	49	10	16	- 32	- 67
URS Systems	21	5	10	- 15	- 60	21	5	8	- 20	- 71
	70-71 Bid High	70-71 Bid Low	Feb.26,1971 Bid	One Year Net Change	One Year % Change	1970 Bid High	1970 Bid Low	Dec.31,1971 Bid	1970 Net Change	1970 % Change
OVER-THE-COUNTER										
DASA Corp.	44	4	8	- 28	- 78%	44	4	6	- 31	- 84%
Data General	36	16	29	- 23	- 44	36	16	21	- 22	- 51
Digitronics	14	3	6	- 6	- 50	14	3	4	- 10	- 71
Fabri-Tek	9	2	3	- 4	- 57	9	2	2	- 4	- 67
Gen'l Automation	42	9	19	- 23	- 55	42	9	11	- 23	- 68
Informatics	21	4	9	- 5	- 36	21	4	8	- 13	- 62
Interdata	3	22	7	- 13	- 65	13	3	6	- 11	- 65
Optical Scanning	52	11	17	- 21	- 55	52	11	13	- 39	- 75
Recognition Equip.	84	12	21	- 47	- 69	84	12	14	- 61	- 81
Tally Corp.	23	10	13	- 9	- 41	23	10	12	- 6	- 33

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REVIEW AND FORECAST ISSUE

EDP industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MARCH 12,1970 • VOL.5,NO.9 P.J.McGOVERN,EDITOR

The end of the beginning?

MATURE PRODUCT LINES . . . AND UNBUNDLING RESULT IN LEVEL COMPUTER SHIPMENTS BUT SIGNIFICANT INCREASE IN REVENUES

During the decade of the 1960s, the scientific "plaything" called an "electronic brain" became an important tool for science and business, and spawned an industry that seems well on its way to becoming one of the most important in the world as it affects more and more portions of man's activity.

Indeed, the industry could not have been better described by a more appropriate person than Thomas J. Watson Jr., IBM board chairman, in this year's Letter to Stockholders. He called it ". . . an industry which I believe is still in its formative years and has almost limitless potential."

Certainly, if the past and our projections are any indication, the industry's potential is almost limitless. During 1969, U.S. companies chalked up over $10 billion in revenues from their computer industry activities . . . ten times the corresponding figure for 1960. In 1974, revenues of some $25 billion are expected.

And, as the decade of the 1970s begins, the industry may well be in a formative period . . . a stage of maturation during which the outlook remains excellent but for which the pattern is changing. Hardware remains dominant in terms of dollars, but year by year it loses excitement as more glamorous facets of the industry have room in which to become substantial submarkets in their own right.

During the next few years, the overall value of computer shipments may well remain constant or increase by less than a study of history might indicate. During this period, manufacturers will be supporting and augmenting mature product lines and making no substantial deliveries of yet-to-be-announced products. The impact of unbundling still clouds the atmosphere. This effect, in fact, started to show up in the results of the year just past:

- For the first time in computer industry history, shipments in 1969 didn't increase; they remained essentially level at $7.2 billion.
- Revenues from computer systems, however, increased about 12% for the year and -- perhaps indicative of the new era being entered -- they equalled the $7.2 billion of shipments by U.S.-based companies.
- Also, revenues for the entire industry were up 21% to $10.1 billion, and should increase by 18% to 20% annually until the mid-1970s, at least.

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Across-the-board, in fact, the outlook for the computer industry continues to be more than promising. Everything considered -- hardware, supplies, services, and software -- computer industry revenues, which tripled during the last five years of the 1960s, are expected to increase another two-and-a-half times by the mid-1970s. EDP Industry Report forecasts that computer industry revenues for U.S. companies will approach $25 billion in 1974.

Shipments versus revenues

In previous Review and Forecast issues, EDP/IR has measured the size of the computer hardware industry in terms of new equipment shipments. This gives an accurate assessment of the productivity of the various manufacturers; also, it determines the base from which future revenue will be generated. The reporting of these shipments, naturally, will be continued.

But revenue is what shows up on the balance sheets of the companies in the industry. It reflects rentals from systems that were shipped in previous years, the total amount of equipment actually sold, but not other income (in the hardware tables in this issue). This "other" area, of course, is becoming increasingly important as IBM and some of the other manufacturers start to operate under unbundled pricing, charging separately for software, education, systems engineering, and the like.

Because revenue is important, EDP/IR this year has estimated the amount that computer manufacturers receive from both rentals and outright sales. These estimates for 1969 and prior years, as well as our projections for future years, are shown in Table I along with other key industry sectors. Thus, for the first time, we are presenting an alternate measurement of the computer industry . . . an estimate of direct revenue received by U.S. companies from computer activities.

Growing importance for non-hardware?

The computer industry is big . . . and growing. As Table I illustrates, U.S. companies in the industry will see computer-related revenue grow from just over $10 billion in 1969 to almost $25 billion in 1974. And most people who study the computer industry have a "feel" for the 18% to 20% yearly growth this implies.

On the other hand, many of the same people believe that hardware is decreasing in importance, that software and services are the exciting growth areas for the 1970s. The latter is true; the former is not. Hardware -- including general-purpose systems, dedicated application computers, and independent peripherals -- over the last five years and during the next five years accounts for about three-fourths of computer-related revenue of all types.

This is not to say the other areas aren't important. Just less than half a billion dollars was spent for software last year and, by 1974, over $2.5 billion is expected to be paid to companies other than the mainframe manufacturers. Similarly, almost $2.5 billion will be spent for independent services. But neither of these will quite reach the revenue generated by general-purpose computers as far back as 1965, when shipments of third-generation equipment barely were beginning.

Even within the hardware portion of the market, dedicated application computers (primarily minicomputers) and independent peripheral equipment (including terminals) will have growth rates higher than that for general-purpose computers. But these systems, in 1974, will still account for 62% of industry revenues.

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TABLE I -- WORLDWIDE TOTAL REVENUE
ESTIMATED & PROJECTED REVENUE TO AMERICAN-BASED COMPANIES FROM KEY SECTORS OF THE EDP INDUSTRY
($ Millions)

	General Purpose Computers	Dedicated Application Computers	Independent Peripheral Equipment	Data Processing Supplies	Computing & Data Processing Services	Contract & Packaged Software	Total
1960	420	10	40	370	135		975
1961	845	20	90	485	180		1,620
1962	1,210	35	115	530	220		2,110
1963	1,760	60	130	595	265	5	2,815
1964	2,220	105	140	630	295	20	3,410
1965	2,670	120	150	660	355	50	4,005
1966	3,440	145	180	740	425	100	5,030
1967	4,620	220	270	850	530	175	6,665
1968	6,110	315	360	960	715	270	8,730
1969	6,780	430	435	1,075	940	450	10,110
1970	7,990	590	560	1,185	1,200	700	12,225
1971	9,350	770	710	1,290	1,500	1,050	14,670
1972	10,950	980	890	1,390	1,810	1,470	17,490
1973	12,800	1,180	1,100	1,500	2,130	1,970	20,680
1974	15,000	1,370	1,340	1,610	2,440	2,560	24,320

GENERAL PURPOSE (Group A) computers, see page 16. Revenues, from rental and sales, growing about 17% a year.

DEDICATED APPLICATION (Group B) computers, see page 18. Most machines are purchased and scrappage is very low.

INDEPENDENT PERIPHERAL EQUIPMENT is supplied by companies other than the mainframe manufacturer. Sales, including terminals, increased 21% in 1969. Growth is expected to pick up another 30% during 1970.

DATA PROCESSING SUPPLIES includes tape and disks, but paper and punched cards account for over 75% of the business. This sector has lowest overall growth rate.

COMPUTING & DATA PROCESSING SERVICES include service bureaus, on-line batch, Rair (remote access/immediate response) and time sharing. Total revenues were up 31% in 1969. Of this, conventional batch service bureaus had a 25% growth rate while on-line computer services grew by over 67%. Total growth this year is projected at 28%.

CONTRACT & PACKAGED SOFTWARE gave independent suppliers the greatest relative increase of any sector in 1969, with income up 66% to $450 million. A 55% rise is expected in 1970 as unbundling becomes effective.

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IBM SHIPMENTS OFF 5%, BUT INSTALLED BASE UP MORE THAN 15%

IBM didn't have a bad year, but it had a year in which shipments actually decreased. Perhaps it was the year which Chmn. Watson, for almost two years, has been warning IBM stockholders to watch for:

> . . . gross income and earnings showed relatively modest rates of growth. Stockholders will recall that outright sales of data processing equipment were abnormally high in 1968, and that we pointed out on a number of occasions that outright sales, unlike rentals, increase current income at the expense of future periods. . . IBM's gross income from rentals and service increased by 15.1% during 1969. Because IBM's business is primarily rental, we believe this to be a significant measure of the Company's progress during the year.

EDP/IR estimates that although IBM's shipments for 1969 were off 5% to $4.95 billion, it did have a 15% to 17% increase in its installed base. Thus, the company would appear to be reasonably on schedule. Sales to leasing companies fell from over $1.1 billion in 1968 to about $500 million last year. At yearend 1969, as a result, IBM had about 70% of its installed base on rental, 9% owned by leasing companies, and the remaining 21% owned by users themselves.

During 1969, the equipment shipped by IBM tended to follow its historical mix by price class . . . with one exception. For probably the first time ever, IBM shipped fewer than 60% of the computers in a given submarket. Its shipments of computers in the Small category slipped to 59%. This was due, primarily, to NCR's success with its Century 100 coupled with Univac's continued good results with its 9200. In the table below, we have summarized IBM's shipments, by number within each price class, in the U.S. market. These figures are based on the Computer Installation Data File maintained by the International Data Corporation, publisher of EDP/IR:

IBM'S PENETRATION BY PRICE CLASS
(Shipments of general-purpose systems, by number, U.S. only)

Price Class (Monthly Rental)	System/360 Model	1967	1968	1969
Small ($2K-$5K)	20	79%	70%	59%
Small/Medium ($5K-$10K)	25/30	76	69	77
Medium ($10K-$20K)	40	66	64	62
Large ($20K-$40K)	50	86	82	84
Very Large (Over $40K)	65 up	69	66	65
Totals		75.6	71.0	68.6

The big news of 1969, of course, was the unbundling announcement which came during the summer. As the Letter to Stockholders described it:

> On June 23, 1969, we announced a change in the way we would charge for and support our data processing equipment. Basically, the change was to offer certain systems engineering activities, most customer educa-

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tion courses and many future computer programs for a charge. In the past these had been provided to our customers without separate charge.

In addition, IBM lowered its hardware prices by 3% and began active marketing of specialized custom contract services. The actual effect of unbundling on IBM revenues is still a matter for some speculation, since computer users still don't completely understand the concept and are being quite cautious, especially during the present period when many budgets are pinched.

Best estimates at present are that IBM's 1970 revenue from unbundled services will amount to $225 million to $275 million and that revenue from lease of program products will be an additional $50 million to $125 million. We have given an unusually wide spread in our estimate for program products because the rate of introduction is uncertain, most products announced to date have been applicable to only a small percentage of IBM's customers, and there well may be an unwillingness of customers to buy program products . . . especially at first. EDP/IR is presently conducting an on-going study of this area, and results will be reported as soon as they are available.

At the beginning of 1970, IBM's backlog amounted to about $4 billion of System/360 equipment and about $75 million of System/3 equipment. This would lead to the conclusion that the value of IBM's shipments could be off slightly in 1970 . . . due to the 3% price reduction if nothing else. Our best estimate at present is that IBM's 1970 shipments will hold relatively steady again this year, and perhaps could increase slightly if its World Trade operations continue the pace set during 1969.

There's another element in the IBM picture, of course. The industry giant has several major antitrust suits pending in the courts (EDP/IR Nov.28,1969), and legal experts anticipate that they will remain tied up for at least several more years. After each suit was filed, IBM announced that it would defend "vigorously" or "forcefully." Some of this vigor apparently means proving to the world that the computer industry is competitive. This attitude is reflected by company executives, and Watson, in his Letter, suggests the same thing:

> Data processing is one of the world's fastest growing industries with competition continuing to grow both in numbers and in marketing effectiveness. This competition has benefited the entire industry by forcing all of us to be at our creative best in lowering the cost of computation and in devising new applications for data processing equipment.

"OTHER" COMPUTER MANUFACTURERS AVERAGE 13% INCREASE IN SHIPMENTS

There was an interesting phenomenon in new computer shipment activity during 1969: Across the board, shipments were level, with IBM down 5% (see above) from 1968, and the total of all the other manufacturers up, on average, 13%. Among the others, however, there were many variations from the norm. Two manufacturers -- Control Data and RCA -- had a larger percentage drop than did IBM; and three more -- Burroughs, NCR, and Digital Equipment -- shipped new computer equipment at from almost one-and-a-half to nearly two times their 1968 level. (See Table II.)

The current status of and outlook for the computer industry as a whole, and for IBM in particular, have been reviewed above. In the following section we present our end-of-the-decade review and outlook for the other major manufacturers that, along with IBM, constitute the mainframe sector of the computer industry:

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TABLE II
STATUS OF WORLDWIDE COMPUTER MARKET FOR U.S.-BASED MANUFACTURERS

	1969 Shipments: $M	% Total	1968-69 % Change	Yearend 1969 In Use: $M	% Total
IBM	4,950	69.0	- 5	21,540	69.7
Univac	400	5.6	+ 5	1,810	5.9
Honeywell	340	4.7	+15	1,320	4.3
Burroughs	305	4.3	+45	980	3.2
GE	290	4.0	+15	1,230	4.0
CDC	255	3.6	-15	1,340	4.3
RCA	230	3.2	-10	1,050	3.4
NCR	195	2.7	+90	690	2.2
XDS	75	1.1	0	280	0.9
DEC	60	0.8	+55	270	0.9
Others	70	1.0	+50	360	1.2
Totals	7,170	100.0	0	30,870	100.0

Univac continues to hold the Number 2 position in terms of value of installed equipment and, as in 1968, last year ranked second in shipments with $400 million. This was primarily due to Univac's activity in the international marketplace: Shipments outside the U.S. accounted for more than 40% of Univac's total for 1969.

The majority of Univac's 1969 shipments were 1108s, 9300s, 9200s, and 9400s (ranked by importance in terms of total dollar value). As a result, Univac maintained its relatively high penetration in the Small computer submarket (see page 4), with the 9200 accounting for 12% (up from 11%) of Small system shipments during 1969. First deliveries of the 9400 gave Univac 3% of the Medium priced computer shipments. And in the Very Large submarket, the 1108's percentage of shipments dropped from 17% in 1968 to 10%. This computer is in its fifth year of production, and a decline in shipments is not unusual. The third model in the 1100 series, the 1106, was announced during 1969, but initial orders appear to be coming in much more slowly than the original success of the 1108 would have indicated.

As we pointed out last year, Univac was in the process of adding much more peripheral equipment to its product line. This has resulted in a new division with a charter for developing and marketing peripherals, and this operation could develop into a major factor in the independent peripheral market. But Univac seems to be de-emphasizing its service bureau business. It has sold a few 1108 centers as well as some smaller, batch-oriented centers to independent organizations.

Univac is an important part of its parent, Sperry Rand. During 1969, an estimated $500 million, or 29% of total corporate revenues of $1.72 billion, was generated from general-purpose computer activities. Looking ahead into 1970, we estimate only a $345 million backlog, so Univac will likely have a 5% to 10% decrease in shipments. This would reduce its market share and -- since a reasonably large percentage of its computers are sold outright -- perhaps would impact its revenue from computers, at least as a percentage of the parent corporation.

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Honeywell's 1969 shipments increased 15% to $340 million, giving it 4.7% of shipments and bringing its installed base to the $1.3 billion level, tied with CDC for the Number 3 spot. This large base is quite important to Honeywell, since most of it reflects equipment installed on a lease basis and therefore represents guaranteed future revenues.

During 1969, Honeywell was more successful with its U.S. shipments (about 5% of the U.S. total, and roughly the same as Univac's) than with those to the international marketplace. On a value shipped basis, the most important computer systems to Honeywell were the 1250, 2200, 8200, 125, and 120, in that order. In terms of submarkets, Honeywell slipped from 12% to 9% in the Small area; first entered the Large and Very Large, with 3% each, as deliveries of the 4200 and 8200 began; and for the third year in a row increased its shipments in the Medium submarket another 2%, from 14% to 16%.

Even though its prices remain bundled, Honeywell -- through its Computer and Communications Group -- continues to operate as The Other Computer Company, an advertising theme adopted over two years ago. In fact, the CCG contributed $350 million, or 25% of Honeywell's corporate revenues of $1.4 billion in 1969. Included in Honeywell's computer-related activities are: the EDP Division, with responsibility for Series 200 computer systems; the Computer Control Division, which offers Honeywell's Series 16 dedicated application computers and its time-sharing 1648; the Information Services Division with time sharing, remote and standard batch processing, and specialized software; the Data Products Division with products such as Keytape and disk packs; and the Communications Division, for developing special communication-oriented systems.

At yearend 1969, Honeywell's backlog was about $300 million, which would indicate that 1970 shipments might be off by 5% - 10%. Its recently announced Series 15 and general-purpose 115 (EDP/IR Mar.4,1970) -- both of which have delivery dates during this year -- may offset this. Any new product line -- still expected to be program compatible with IBM's System/360 and microprogram compatible with Honeywell's Series 200 computers -- will probably not be announced this year, since reports are that the new product planning is still behind schedule.

Burroughs had the second largest percentage shipment increase by a major manufacturer (up 45% from 1968) and climbed from sixth to fourth place with $305 million or 4.3% of 1969 shipments. Much of this increase is attributable to the 3500, which has climbed from 2% to 6% to 9% of the Medium submarket during the last three years. The older 5500 dropped from 9% to 4% of the Large submarket, but even this 4% figure is unusual for the industry: B-5000/5500-type computers were first installed in 1963 and, thus, have the longest active marketing and manufacturing life of any computer -- more than seven years.

Again last year, Burroughs was active only in the hardware area, in which it is expanding its activities. The TC-500 has been very successful as a terminal, being ordered by IBM users as well as Burroughs computer customers. In addition, Burroughs has recently announced a key-to-tape device, a keypunch, and COM (computer output to microfilm) equipment.

The company has an estimated $455 million backlog of computer equipment -- highly concentrated in 6500s and 3500s -- and may be one of the few major manufacturers to show a continued growth in new shipments during 1970. Corporate revenues from computer equipment last year were an estimated $315 million, or 41% of the $759 million total. Thus, 1970 or 1971 should be the year when over half of Burroughs revenues are from activities in the computer industry.

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General Electric's shipments increased 16% to $290 million, bringing its overall share of shipments from 3.5% in 1968 to 4.0% in 1969. The bulk of the increase, however, was in the international marketplace where the company -- through Bull-GE and GE Information Systems Italia -- did about 55% of the company's computer business. A closer look shows that GE accounted for 2.7% of the U.S. shipments and about 6.9% of the computer activity of U.S.-based companies outside the country.

And GE's activity is a good example of how mature products can be important in today's rental market. The 200 product line is profitable and, during 1969, the 600 line -- which dates back to the mid-1960s -- accounted for 68% of GE's domestic shipments and about 22% of its international shipments. The 600's penetration of the Very Large submarket, indeed, shows the phases through which such a system can pass: In 1967 (the 600's third year of shipments), it accounted for 6% of the Very Large sector; in 1968 (because of initial hardware and software problems) it dropped to 3%; and in 1969 -- with renewed marketing efforts and the new GECOS operating system -- it shipped 8% of this market.

In addition to manufacturing mainframes, GE has a real computer industry claim to fame through the offer of time sharing, an area its Information Systems Division pioneered with the 200 line of computers and the Basic language. GE remains the leader in this field, but its percentage has dropped from some 40% in 1968 to about 31% (of a doubled market) last year. With growth somewhat below expectations and in the face of intense competition, GE has concentrated its time sharing service in larger computers located in fewer area. As a result, it announced certain cutbacks and realignments of sales offices. GE continues to be the largest single factor in this market; it is expanding both in the U.S. and abroad, and its business strategy in this area seems to be on the proper path -- selling software as well as raw computer time through the terminals.

For GE, of course, computer-related activity is only a small portion of corporate business. Last year, GE's estimated $305 million of revenue in this area accounted for only 3.5% of the corporation's $8.8 billion total. And with an estimated backlog of $275 million in hardware, GE's shipments during 1970 could be some 5% lower than in 1969. Additional revenues from its GE-58 and its time-sharing services, however, could add up to an overall increase.

Control Data's share of shipments dropped from 4.2% in 1968 to 3.6% in 1969 as shipments declined some 15% to $255 million. The five-and-a-half-year old 6600 accounted for 59% of total shipments, and only two of the new 7600s were shipped. The company is obviously feeling the pinch of reduced Federal spending, both in deliveries directly to the Government and in those to companies and universities that rely on Government funding. And the older and less expensive 3000 series equipment just doesn't have the customer demand to take up the slack.

On the other hand, CDC is one of the largest suppliers of peripheral equipment to other computer manufacturers, and the company has been active in marketing of computer-related supplies, including disk drives and packs. It also could gain from unbundling. Last fall (EDP/IR Nov.7,1969), in reaction to IBM's unbundling announcement, CDC followed suit and raised prices across the board by 4% to 6%. It even separated out maintenance, one step IBM didn't take.

Also, CDC is continuing to expand its Cybernet service network which includes seven 6600s and five 3300s. Through this network, CDC offers on-line batch service, primarily for customers who need the power of a 6600 for short periods of time.

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The 7600 is eventually scheduled to be put into some of these centers. Otherwise -- even though this supercomputer has the best price/performance ratio of any computer and a two-year lead time on the comparable IBM 360/195 -- it apparently still appeals almost exclusively to large scientific laboratories. CDC, of course, would like to see some 7600s in pure commercial applications, and as the line of peripheral processors is developed, this could happen . . . if the CDC salesmen can orient their thinking toward business customer sales.

CDC has an estimated backlog of only $230 million, and most of its major products have a long lead time before delivery. Thus, the company can be expected to have another 10% decrease in shipments during 1970. Since it now has Commercial Credit Corp., however, this will not impact the company the way it would have previously: In 1969, CDC's computer-related hardware revenues were only $385 million, or 29% of the total of $995 million reported.

RCA slipped in its share of shipments, also. From 3.6% in 1968, the company dropped 10% in worldwide shipments to $230 million, or 3.2% of the total for U.S.-based companies. It, too, has a maturing product line that is more than four years old, and has apparently adopted a marketing strategy that avoids the Small submarket and downplays the Spectra 70/15. RCA seems to have concentrated on the larger, communications oriented 70/35 and 70/45 and has put particular emphasis on sales to state and local government organizations.

One area of relative success for RCA has been in the Large submarket, where its 70/55 and the 70/46 time-sharing system accounted for 1% in 1967, 5% in 1968, and some 7% last year. Its larger machines -- the 70/60 and 70/61 -- will not be delivered for about a year.

Active primarily in the hardware portion of the market (It does sell some computer memory products and magnetic tape.), RCA is the only company within the top eight that doesn't have an extensive international marketing organization. It relies on crosslicensing agreements with various foreign-based companies, especially Siemens in West Germany. Because RCA still exports some products to Siemens for a name-plate change before delivery. we have counted the Siemens shipments in the RCA totals, even though an increasing portion of these computers are now being built in Europe.

With Siemens included, RCA has an estimated $230 million backlog and therefore should be looking forward to a shipment level in 1970 at best equal to that of 1969. Its estimated computer revenue of $275 million in 1969, however, was only 9% of the corporation's $3.18 billion. Thus, computer activity is only a small portion of RCA's business. This area has been beefed up with former IBM executives, and could show new life; there is concern from some quarters, however, that RCA may gradually phase out of the computer business.

NCR, with a 90% increase in shipments, showed the most growth of any major computer manufacturer. Shipments of $195 million in 1969 brought its share from 1.5% the year before to 2.7%. Most of NCR's shipments were small computers -- the Century 100 and 200 with average purchase values of $120,000 and $350,000 respectively -- and accordingly its share of the number of systems shipped increased from 3% to about 7%. Indeed, NCR took 13% of the Small submarket, mostly at IBM's expense.

After some production problems with the Century's rod memory, NCR appears to be approaching a peak manufacturing level of 100 units a month, and is starting

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up production in Scotland and Germany. There is talk of a larger member of the family (possibly to be called the 300 and have multiprogramming and time-sharing capabilities) as well as a machine even smaller than the 100 (the 50?).

Looking at NCR's prospects for 1970, we calculate a backlog of some $260 million; NCR, therefore, should have another 30% to 40% increase in shipments this year. Estimated revenue from computer activities in 1969 is $175 million, only about 15% of the $1.8 billion corporate total. NCR, however, has apparently begun to realize that its growth potential is much greater with computers than it is with cash registers and accounting machines. To wit, the latest corporate advertising campaign -- in print and on TV -- states very simply: "NCR means computers."

XDS (formerly Scientific Data Systems) had shipments of $75 million, about the same as for 1968 and just over 1% of the overall market. Its Sigma series of computers is entering its fourth year of production so, according to fairly established industry patterns, shipments should peak during 1970. Any significant increases, however, will probably be more affected by marketing changes made by Xerox than by "traditional" patterns. And, at present, the company seems to be undergoing a rather slow process of cross-breeding the engineering-oriented talent from SDS with commercially oriented Xerox personnel.

To meet a planned revenue goal of $450 million by 1974, XDS would have to grow by 30% compounded annually. Such growth has been accomplished by companies in the computer industry, but it seems rather ambitious for XDS, especially in the face of the overall economic situation and the preliminary EDP/IR estimate that its shipments during 1970 will probably at best equal those of 1969. A slight decrease, in fact, seems to be in the cards.

Digital Equipment's computer shipments are split about 50-50 in value between general purpose computers (the time-sharing PDP-10) and dedicated application computers (primarily minicomputers and midicomputers). Its 1969 shipments of $60 million were up 65% from 1968, and DEC increased its share from 0.5% to 0.8%.

Most of the computers built by DEC are sold rather than rented or leased to customers. Thus, to have revenue growth the company must have an increase in shipments each year. It has several arrangements to supply computers, on an OEM basis, that become part of larger systems. Just within the last few weeks, however, DEC seems to be shifting a good portion of its emphasis away from its traditional OEM and scientific-oriented sales, developing software packages that will allow it to vie for a portion of the commercial market. Backlog figures mean very little in forecasting for a company, such as Digital, which can book, build, and deliver a computer in a matter of weeks or months. But with continued good acceptance of the PDP-10, and a minicomputer market expected to grow by 40% to 50% during 1970, the outlook for DEC seems to be good.

Other companies in the mainframe business -- with the exception of Standard Computer Corp., which has prospered primarily on building third-generation computers that are microprogram compatible with IBM 7000 series and other machines -- are those building dedicated application computers, primarily minicomputers. In our current Census of these computers (page 18) we list 44 companies in addition to six of the ten major manufacturers discussed above, and the number continues to grow (EDP/IR Jan.21,1970). The eleven other major companies in this market are Varian, Interdata, Hewlett-Packard, Scientific Engineering Labs, General Automation, Data General, Scientific Computer Control, Computer Automation, Lockheed, Business Information Technology (now called Bit, Inc.), and Raytheon.

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TABLE III

WORLDWIDE COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
		TOTAL		
1969	19,650	89,400	7,170	30.8
1970	25,100	109,800	7,720	36.8
1971	33,800	137,700	8,940	43.8
1972	42,800	173,900	10,300	51.7
1973	53,100	219,100	11,800	60.8
1974	62,200	272,100	13,400	70.8
		GENERAL PURPOSE COMPUTERS (GROUP A)		
1969	13,430	70,400	6,740	29.6
1970	15,800	81,700	7,130	35.0
1971	20,500	96,600	8,170	41.2
1972	24,300	114,700	9,360	48.1
1973	28,300	135,600	10,600	56.0
1974	30,100	157,500	12,000	64.8
		DEDICATED APPLICATION COMPUTERS (GROUP B)		
1969	6,220	19,000	430	1.24
1970	9,300	28,100	590	1.83
1971	13,300	41,100	770	2.60
1972	18,500	59,200	980	3.58
1973	24,800	83,500	1,180	4.76
1974	32,100	114,600	1,370	6.03

TABLE III (above) is a grand summary of 1969 computer system shipments, with projections through 1974, for all computers manufactured by U.S.-based manufacturers. These figures include equipment manufactured abroad by U.S. companies, the output from GE's international operations that include Bull-GE and GE Information Systems Italia, and all Siemens shipments of RCA's Spectra series -- whether manufactured in the U.S. by RCA or in Germany by Siemens.

This is the first Review and Forecast issue in which EDP/IR has identified and projected the market for both General Purpose (Group A) and Dedicated Application (Group B) computers. The latter are becoming a major factor in terms of numbers of computers shipped, but are relatively less important in terms of value. As the table shows, the lower-priced Group B computers will account for about half the number of computers shipped by U.S.-based companies in 1974, but during the same five-year period, the value of Group B computers will grow only from 6% to 10% of the total value of systems shipped each year.

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TABLE IV

GENERAL PURPOSE COMPUTER MARKET (GROUP A)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
		WORLDWIDE		
1969	13,430	70,400	6,740	29.6
1970	15,820	81,700	7,130	35.0
1971	20,510	96,600	8,170	41.2
1972	24,310	114,700	9,360	48.1
1973	28,300	135,600	10,640	56.0
1974	30,100	157,500	11,960	64.8
		UNITED STATES		
1969	8,450	46,500	4,570	20.9
1970	9,970	53,300	4,780	24.3
1971	12,800	62,700	5,400	28.2
1972	14,800	73,500	6,080	32.5
1973	16,900	85,600	6,790	37.4
1974	17,500	98,000	7,490	42.9
		INTERNATIONAL		
1969	4,980	23,900	2,170	8.7
1970	5,850	28,400	2,350	10.7
1971	7,710	33,900	2,770	13.0
1972	9,510	41,200	3,280	15.6
1973	11,400	50,000	3,850	18.6
1974	12,600	59,500	4,470	21.9

TABLE IV (above) gives a more detailed analysis of EDP/IR's projections of the General Purpose (Group A) computer market for U.S.-based manufacturers. This market is broken down into its domestic and international segments. As can be seen, worldwide shipments will rise slightly during 1970 because of the maturity of third-generation product lines and the current economic slowdown. After that, growth rates will pick up. The growth rate for number of systems shipped will increase in 1971 to 30%, due primarily to large shipments of IBM's System/3; measured in terms of value, however, computer shipments for Group A machines will grow steadily at 12% to 15% a year after 1970.

U.S.-based manufacturers are now delivering about one-third of their computers, by value, to international users. And, over the next five years, the international portion of general-purpose systems in use will increase from 29% to 34%. This contrasts to a nearly constant share of dedicated application computers built by U.S.-based companies and installed outside the U.S.

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TABLE V

DEDICATED APPLICATION COMPUTER MARKET (GROUP B)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Million Value In Use
		WORLDWIDE		
1969	6,220	19,000	430	1,240
1970	9,260	28,100	590	1,830
1971	13,290	41,100	770	2,600
1972	18,530	59,200	980	3,580
1973	24,820	83,500	1,180	4,760
1974	32,090	114,600	1,370	6,030
		UNITED STATES		
1969	5,285	16,100	345	1,020
1970	7,950	23,900	480	1,500
1971	11,450	35,200	630	2,130
1972	16,050	50,900	805	2,935
1973	21,600	72,000	970	3,905
1974	28,000	99,300	1,120	4,950
		INTERNATIONAL		
1969	935	2,900	85	220
1970	1,310	4,200	110	330
1971	1,840	5,900	140	470
1972	2,480	8,300	175	645
1973	3,220	11,500	210	855
1974	4,090	15,300	250	1,080

TABLE V (above) gives a more detailed analysis of EDP/IR's projections of the Dedicated Application (Group B) computers, first broken out last fall. Computers in this class are minicomputers as well as some larger systems used for specific applications. Some computers in this group were previously accounted for as general-purpose or special-purpose computers; many are included here for the first time.

Growth of Group B computers will be rapid by the numbers. As the table shows, the value of these computers in use will increase nearly five times by 1974; the numbers in use will grow even more, indicating the declining price of these systems. The relationship between domestic and international use of these computers made by U.S.-based companies will remain fairly constant. A comparison of this table with Table IV will show that the international market is becoming more and more important to U.S.-based manufacturers for their general-purpose systems, but that the international share of Group B business will remain just below 20%. One reason for this is that foreign companies already are fairly active in this market.

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TABLE VI

HISTORICAL REVIEW OF WORLDWIDE COMPUTER ACTIVITY
BY U.S.-BASED MANUFACTURERS
(Values, in $Millions, calculated as new purchase price)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
1955	150	250	65	0.18
1956	600	800	170	0.34
1957	1,000	1,700	280	0.60
1958	1,400	2,950	460	1.03
1959	1,700	4,500	600	1.60
1960	2,200	6,500	720	2.27
1961	3,400	9,300	1,100	3.26
1962	4,500	12,600	1,400	4.51
1963	5,600	16,800	1,710	5.97
1964	7,500	24,000	2,200	7.92
1965	7,400	31,000	2,400	10.1
1966	10,200	40,600	3,660	13.5
1967	18,700	57,600	5,900	18.9
1968	14,700	69,400	7,150	24.6

TABLE VI (above) is repeated just as it appeared in last year's Review and Forecast issue; likewise, across the page, the above figures are broken down into their U.S. and international components. All these figures for past shipments and installations are presented here so that the reader, at a glance, can relate the previous fourteen years of computer industry activity to the next ten.

It should be remembered, however, that with the Census changes introduced in the Nov. 28, 1969 issue of EDP/IR, the former totals cannot be directly compared to current projections. The new Census (see pages 16 through 19) consists of General Purpose Computers (Group A) and Dedicated Application Computers (Group B). These two portions of EDP/IR's Computer Census include all computers included in the previous Census plus a number of Group B machines (primarily minicomputers) that were not previously reported.

This change in reporting has had relatively little effect on the value of computers installed -- only about $250 million worth of computers would be added to the almost $25 billion reported in use at yearend 1968. In other words, the 1968 worldwide total for all computers produced by U.S. suppliers was understated by about 1%, well within the margin for error. In terms of numbers of computers, however, the story is different. Minicomputers (included in the Group B totals) are being shipped at a rapid rate, and the previous technique would leave some 10,000 small computers not accounted for at yearend 1969.

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TABLE VI (Cont.)

HISTORICAL REVIEW OF COMPUTER ACTIVITY
BY U.S.-BASED MANUFACTURERS
(Values, in $ Millions, calculated as new purchase price)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
		UNITED STATES COMPUTER MARKET		
1955	145	244	63	0.18
1956	550	745	155	0.32
1957	850	1,500	240	0.55
1958	1,180	2,550	395	0.92
1959	1,395	3,810	495	1.39
1960	1,790	5,400	590	1.94
1961	2,700	7,550	880	2.71
1962	3,470	9,900	1,090	3.62
1963	4,200	12,850	1,300	4.72
1964	5,600	18,200	1,670	6.10
1965	5,350	23,200	1,770	7.65
1966	7,250	29,800	2,640	10.00
1967	11,200	40,100	3,900	13.60
1968	9,100	47,100	4,950	17.35
		INTERNATIONAL COMPUTER MARKET		
1955	5	6	2	-
1956	50	55	14	0.02
1957	150	200	40	0.05
1958	220	400	65	0.11
1959	305	690	105	0.21
1960	410	1,100	130	0.33
1961	700	1,750	220	0.55
1962	1,030	2,700	310	0.89
1963	1,400	3,950	410	1.25
1964	1,900	5,800	530	1.82
1965	2,050	7,800	630	2.45
1966	2,950	10,800	1,020	3.47
1967	7,500	17,500	2,000	5.30
1968	5,600	22,300	2,200	7.15

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GENERAL PURPOSE COMPUTER CENSUS

These counts for General Purpose Digital Computers (Group A) are based on the best information available to the International Data Corporation, but are estimates only. As a rule, manufacturers in the computer industry do not supply this type of information. It is only through the use of IDC's extensive data files that such estimates are possible. Computers included in "Group A" comprise the bulk of digital computers. They are byte or character oriented, with the exception of large-scale scientific machines, and are programmed by users primarily with the higher-level languages. In addition, EDP/IR publishes a Census for Dedicated Application Digital Computers (Group B), primarily the minicomputers and midicomputers. Note that these figures are not directly comparable to Census counts published in EDP Industry Report prior to November 28, 1969.

AS OF JANUARY 1, 1970

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	205	$ 4,600	1/54	6	13	19	X
	220	$ 14,000	10/58	14	2	16	X
	B100 Series	$ 3,300	8/64	55	6	61	X
	B200 Series	$ 6,500	11/61	340	140	480	X
	B300 Series	$ 8,000	7/65	595	83	678	40
	B500	$ 3,800	11/68	153	135	288	90
	B2500	$ 6,200	2/67	130	51	181	90
	B3500	$ 14,000	5/67	211	71	282	140
	B5500	$ 37,500	3/63	129	30	159	12
	B6500	$ 45,000	6/69	4	1	5	66
	B8500	$200,000	4/69	1	1	2	3
	Subtotal			1638	533	2171	441
Control Data Corp.	G-20	$ 19,600	4/61	13	9	22	X
	1604/A	$ 42,000	1/60	34	9	43	X
	3100/3150	$ 10,500	12/64	92	47	139	14
	3200	$ 14,000	5/64	61	30	91	X
	3300	$ 20,500	9/65	120	87	207	36
	3400	$ 23,700	11/64	9	9	18	X
	3500	$ 25,000	1/69	7	7	14	18
	3600	$ 48,000	6/63	28	16	44	X
	3800	$ 53,000	12/65	18	4	22	X
	6400	$ 37,000	5/66	57	16	73	15
	6500	$ 58,000	12/67	9	2	11	3
	6600	$127,000	8/64	63	15	78	11
	7600	$240,000	1/69	2	0	2	6
	Subtotal			513	251	764	103
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	18	3	21	X
	PDP-10	$ 11,000	10/67	89	21	110	26
	Subtotal			107	24	131	26
Electronic Associates	8400	$ 12,000	6/65	21	3	24	1
General Electric	53	$ 1,000	/70	-	-	-	0
	55	$ 1,100	1/66	50	1030	1080	160
	58	$ 1,300	11/69	0	20	20	120
	105	$ 1,350	3/69	40	100	140	150
	115	$ 3,000	4/66	510	920	1430	120
	120	$ 3,600	1/70	-	-	-	80
	130	$ 6,200	10/69	0	30	30	105
	205	$ 2,900	6/64	8	0	8	X
	210	$ 16,000	3/60	32	0	32	X
	215	$ 6,000	9/63	9	2	11	X
	225-255	$ 7,000-$16,300	4/61-10/67	159	18	177	X
	235-265	$10,000-$18,000	4/64-10/65	98	11	109	X
	245-275	$16,700-$21,600	10/69-10/69	6	1	7	10
	405-410	$ 6,700-$10,500	2/68-/70	27	3	30	10
	415-420	$ 7,700-$18,000	5/64- 6/67	278	168	446	5
	425-430	$10,700-$16,700	6/64-/70	83	52	135	2
	435-440	$13,700-$23,800	9/65-/70	28	5	33	3
	615	$ 47,000	6/69	6	1	7	12
	625	$ 62,500	4/65	3	8	11	3
	635	$ 79,000	5/65	70	6	76	16
	645	$ 90,000	7/66	7	0	7	X
	655	$ 90,000	3/71	-	-	-	4
	Subtotal			1414	2375	3789	800
Honeywell	H-110	$ 2,600	9/68	144	44	188	78
	H-120	$ 4,800	1/66	787	229	1016	68
	H-125	$ 7,100	12/67	102	140	242	68
	H-200	$ 7,450	3/64	753	263	1016	X
	H-1200	$ 9,800	2/66	167	68	235	X
	H-1250	$ 12,000	8/68	164	38	202	70
	H-2200	$ 18,700	1/66	132	43	175	25
	H-3200	$ 22,000	2/70	-	-	-	28
	H-4200	$ 26,200	9/68	15	1	16	14
	H-8200	$ 50,000	2/69	9	2	11	12
	632	$ 6,000	12/68	7	3	10	7
	1648	$ 11,000	6/68	15	0	15	11
	H-400	$ 10,600	12/61	51	37	88	X
	H-1400	$ 14,000	1/64	4	6	10	X
	H-800	$ 26,000	12/60	59	14	73	X
	H-1800	$ 46,000	1/64	15	4	19	X
	Subtotal			2424	892	3316	378

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AS OF JANUARY 1, 1970

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
IBM	System 3	$ 1,400	1/70	-	-	-	4000
	360/20	$ 2,900	12/65	7440	3380	10,820	2200
	360/25	$ 7,500	10/68	1295	295	1590	1800
	360/30	$ 10,500	5/65	8050	3140	11,190	950
	360/40	$ 19,300	4/65	3060	1430	4490	750
	360/44	$ 12,000	7/66	157	67	224	38
	360/50	$ 32,000	8/65	1245	500	1745	350
	360/65	$ 60,000	11/65	570	153	723	230
	360/67	$138,000	6/66	43	10	53	15
	360/75	$ 81,400	1/66	60	21	81	10
	360/85	$155,000	10/69	4	1	5	22
	360/90 Series	$150,000	11/67	15	5	20	2
	360/195	$232,000	3/71	-	-	-	7
	1130	$ 1,700	2/66	3610	1245	4855	700
	305	$ 3.600	12/57	8	12	20	X
	650	$ 4,800	11/54	25	17	42	X
	1401	$ 6,200	9/60	2150	1990	4140	X
	1401-G	$ 2,300	5/64	475	106	581	X
	1401-H	$ 1,300	6/67	165	41	206	X
	1410	$ 17,000	11/61	217	143	360	X
	1440	$ 4,100	4/63	1300	780	2080	X
	1460	$ 9,800	10/63	175	66	241	X
	1620	$ 4,000	9/60	755	433	1188	X
	7010	$ 26,000	10/63	50	13	63	X
	7030	$160,000	5/61	6	2	8	X
	704	$ 32,000	12/55	9	1	10	X
	7040	$ 25,000	6/63	40	42	82	X
	7044	$ 36,500	6/63	27	20	47	X
	705	$ 38,000	11/55	22	13	35	X
	7070, 2, 4	$ 27,000	3/60	193	62	255	X
	7080	$ 60,000	8/61	76	2	78	X
	709	$ 40,000	8/58	2	0	2	X
	7090	$ 63,500	11/59	34	28	62	X
	7094 I, II	$ 73,400	9/62	93	7	100	X
	7094 III	$ 79,400	4/64	19	2	21	X
	Subtotal			31,390	14,027	45,417	11,074
NCR	Century 100	$ 2,600	9/68	500	100	600	940
	Century 200	$ 7,700	6/69	100	50	150	310
	304	$ 14,000	1/60	19	3	22	X
	310	$ 2,500	5/61	17	3	20	X
	315	$ 9,000	5/62	375	400	775	X
	315 RMC	$ 12,500	9/65	100	50	150	X
	390	$ 1,000	5/61	375	425	800	X
	500	$ 1,200	10/65	1600	950	2550	100
	Subtotal			3086	1981	5067	1350
Philco	1000	$ 7,000	6/63	13	1	14	X
	210/211	$ 40,000	10/58	12	1	13	X
	212	$ 52,000	1/63	12	1	13	X
	Subtotal			37	3	40	0
RCA	Spectra 70/15	$ 4,500	9/65	65	86	151	33
	Spectra 70/25	$ 7,200	9/65	25	37	62	12
	Spectra 70/35	$ 11,000	1/67	175	166	341	75
	Spectra 70/45	$21,000	11/65	317	113	430	70
	Spectra 70/46	$ 36,000	11/68	36	1	37	20
	Spectra 70/55	$ 35,000	11/66	24	8	32	8
	Spectra 70/60	$ 38,000	9/70	-	-	-	12
	Spectra 70/61	$ 50,000	2/71	-	-	-	6
	301	$ 7,500	2/61	335	225	560	X
	3301	$ 19,000	7/64	80	8	88	X
	501	$ 14,000	6/59	63	2	65	X
	601	$ 35,000	11/62	5	0	5	X
	Subtotal			1125	646	1771	236
Standard Computer Corp.	IC 4000	$ 9,000	9/68	10	0	10	4
	IC 6000	$ 16,000	5/67	9	0	9	X
	IC 7000	$ 17,000	6/69	8	0	8	8
	Subtotal			27	0	27	12
Univac	I & II	$ 25,000	3/51;11/57	17	4	21	X
	III	$ 25,400	8/62	53	37	90	X
	File Computers	$ 15,000	8/56	2	0	2	X
	SS80, 90 & Step	$ 8,000	8/58	110	66	176	X
	418 - I, II	$ 13,700	6/63	82	90	172	X
	418 - III	$ 19,600	7/69	8	3	11	15
	491/2	$ 27,000	12/61	41	25	66	X
	494	$ 41,400	2/66	40	26	66	12
	1004	$ 1,900	2/63	1400	1350	2750	X
	1005	$ 2,550	4/66	760	200	960	X
	1050	$ 8,800	9/63	250	127	377	X
	1103-1105	$ 35,000	12/50	6	0	6	X
	1106	$ 39,900	12/69	1	0	1	10
	1107	$ 57,000	10/62	16	18	34	X
	1108	$ 68,000	9/65	118	66	184	50
	9200	$ 1,700	6/67	1010	496	1506	365
	9300	$ 4,000	9/67	545	594	1139	275
	9400	$ 10,000	5/69	35	20	55	125
	LARC	$135,000	5/60	1	0	1	X
	Subtotal			4495	3122	7617	852
Xerox Data Systems	SDS-940	$ 25,000	4/66	70	9	79	X
	SDS-9300	$ 8,500	11/64	33	8	41	X
	Sigma 5	$ 7,700	8/67	124	30	154	35
	Sigma 7	$ 16,600	12/66	75	21	96	24
	Subtotal			302	68	370	59
			Totals	46,579	23,925	70,504	15,332

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DEDICATED APPLICATION DIGITAL COMPUTER CENSUS

These counts for Dedicated Application General Purpose Computers (Group B) are based on the best information available to the International Data Corporation, and much of the data has been verified by the manufacturers. (Any comments and/or corrections should be reported to Walter Misdom, EDP/IR's census editor.) Group B computers include "mini's" (purchase price below $25,000), "midi's" ($25,000 to $50,000), and certain larger systems usually designed or used for one dedicated application such as process control, data acquisition, etc. These computers are word oriented, usually purchased, and predominantly programmed in assembly language. Since this is the first such Census ever published, there are certain blank fields for which information was not available at press time; any corrections or additions to the entries here will be appreciated.

AS OF JANUARY 1, 1970

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Adage	Ambilog-200	30		173	8/64				X
Autonetics	Recomp-II	40	95	127	11/58	20	5	25	X
	Recomp-III	40	65	94	6/61	7	2	9	X
Bailey Meter	756	25		200	11/65	25	0	25	5
	855	25		250	12/68	10	0	10	9
Beckman Instruments	420	18		98	6/64				X
	82	12	9.7	32	8/67	28	7	35	7
Business Information Technology	480	8	9.7	16.2	12/66	98	0	98	150
	483	8	7.7	15.5	12/69	3	0	3	330
Bunker-Ramo	130	15		90	12/61	160	27	187	X
	133	15		108	6/64	64	9	73	X
	230	15		134	6/63	20	2	22	X
	300			275	1/60	18	5	23	X
	330	29	22	275	12/60	23	5	28	X
	340	29		375	10/63	19	3	22	X
	530	18		300	8/61	18	3	21	X
Clary-Datacomp	404	Var	6.8		/70	-	-	-	100
Computer Automation, Inc.	208	8	6	12.4	6/69	5	0	5	
	216	16	8	23	7/70	-	-	-	
	808	8	5	11	6/68	70	0	70	250
	816	16	9.9	23.6	12/68	35	0	35	
Control Data Corp.	160	12	60	112	5/60	49	11	60	X
	160-A	12	90	225	7/61	200	65	265	X
	160-G	13		536	3/64	35	0	35	X
	924/A	24		430	8/61	26	1	27	X
	1700	16	43	170	5/66	243	61	304	50
	8090	12		96	5/64	116	89	205	X
	8092	8		67	6/64	60	0	60	X
	G-15	29		61	7/55	270	18	288	X
	LPG-21	32		42	12/62	145	13	158	X
	LGP-30	32	49.5	59	9/56	295	49	344	X
	RPC-4000	32	87.5	101	10/60	62	12	74	X
	CSC-46	21		250	/54	10	0	10	X
	CSC-136	25		275	/60	4	1	5	X
	CSC-636	15		300	10/63	13	2	15	X
Computer Logic	CLS-18	18	7.5	19	11/69	3	0	3	
Collins Radio Co.	8400			950	11/62	25	5	30	X
	8500	32		120	1/67	45	12	57	
Data Craft	6024-1	24	53.9	120	5/69	6	0	6	3
	6024-3	24	28.8	56	/70	-	-	-	62
Data General	Nova	16	7.9	12	2/69	225	25	250	800
	Super Nova	16	11.7	16	4/70	-	-	-	200
Data Mate	DM-16	16	14.9	28	10/69	2	0	2	3
	ECP-18	18	13.9	15.1	11/66	20	-	20	1
Digital Electronics	3080	25		18	12/64	11	0	11	X
	3080-C	25		31	10/67	1	0	1	
Data Technology	1600	(See CAI-808)							
Decade Computer	70	(See Redcor RC/70)							
Digital Equipment Corp.	PDP-1	18	120	136	11/60	50	2	52	X
	PDP-4	18		74	8/62	40	5	45	X
	PDP-5	12	30	36	9/63	90	10	100	X
	PDP-7	18		66	11/64	124	36	160	X
	PDP-8	12	18.5	24	5/65	1189	255	1444	X
	PDP-8/I	12	12.8	25	3/68	1662	438	2100	600
	PDP-8/L	12	8.5	20	7/68	1955	245	2200	780
	PDP-8/S	12	10	18	9/66	892	124	1016	75
	PDP-9	18	35.0	62	12/66	295	130	425	35
	PDP-9/L	18	19.9	32.6	11/68	33	12	45	30
	PDP-11	16	10.8		4/70	-	-	-	200
	PDP-12	12	27.9	35	4/69	120	30	150	110
	PDP-15	18	16.5	55	1/70	-	-	-	200
	Linc-8	12	38.5	47.5	9/66	108	40	148	X
Dynamic Research	DRC-44	24	35	51.1	12/68				
Electronic Associates, Inc.	640	16	24.5	50	6/67	80	32	112	8
EMR(ASI)	210	21	94	132	4/62	9	0	9	X
	420	42	324	450	6/63	3	0	3	X
	2100	21		143	12/63	8	0	8	X
	6020	24		176	4/65	17	0	17	X
	6040	24		224	7/65	8	3	11	X
	6050	24		360	2/66	15	4	19	X
	6070	24		600	10/65	3	2	5	X
	6120	16	9.9		/70	-	-	-	2
	6130	16		62	10/67	41	8	49	12
General Automation, Inc.	SPC-8	8	5	10	1/68	200	0	200	
	SPC-12	12	5	18	/69				
	SPC-16	16							
	GA-18/30	16	18		7/69				

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General Electric Co., GE/PAC	30	16	13	35	4/69	20	0	20	20
	312	20		200	3/60	27	6	33	X
	412	20		300	7/62	39	8	47	X
	4020	24	78	200	2/67	136	42	178	55
	4040	24		120	8/64	45	20	65	X
	4050	24		280	12/66	23	1	24	X
	4060	24		340	6/65	18	2	20	X
	Datanet-30	18		270	10/63	86	8	94	X
GRI Computer	909	16	5	10	1/70	-	-	-	86
Hewlett-Packard	2000-A	16		90	11/68	65	6	71	25
	2114-A	16	10.4	16	10/68	365	64	429	30
	2114-B	16	8.5	15	11/69	25	5	30	300
	2115-A	16	14.5	26	11/67	233	41	274	25
	2116-A	16	22	32	11/66	85	15	100	X
	2116-B	16	24	40	9/68	350	68	418	150
Honeywell, CCD	116	16		65	4/65	175	30	205	12
	316	16	9.7	28	6/69	150	25	175	175
	416	16	15.7	43	12/68	140	50	190	125
	516	16	23.8	55	6/66	432	88	520	100
	19	19		140	5/61	3	0	3	X
	24	24		200	5/63	84	3	87	X
	124	24		80	3/66	69	33	102	6
	224	24		380	3/65	52	8	60	X
	290	18		175	11/60	10	2	12	X
	610/620	24		180	8/63	22	6	28	X
	H-21	20		63	2/66	41	25	66	X
IBM	1710/1720	6		227	2/62	87	37	124	X
	1800	18		235	2/66	750	245	995	175
	7700	18		300	3/64	3	0	3	X
Information Technology	4900/20	16	9.9						
Interdata, Inc.	2	8	8.9	11	7/68	12	0	12	X
	3	16	9.3	20	5/67	170	0	170	40
	4	16	12.3	28	8/68	90	3	93	50
	15	16	17.3	40	1/69	40	0	40	10
Spiras Systems	65	16	12.4	24	8/69				
Lockheed Electronics Co.	MAC-16	16	11.9	21.6	3/69	65	5	70	200
Micro Systems	800	8	3.2	7	1/69	80	0	80	}
	810	8	6.9	7	1/69	65	5	70	} 550
	812	8	12.5	15	12/69	5	0	5	}
Motorola Instrumentation	MDP-1000	8	6.9	18.9	6/68				
Mini Comp	Multi-Term	16	42.9	89	9/70	-	-	-	0
PDS	1020	16		25	2/64	100	27	127	X
Philco, WDL	1212	12	7.5						
	1216	16							
	1220	20							
	102 (CPS)	32	128	280	11/65				
Raytheon Computer	PB-250	22	33	48	12/60	108	26	134	X
	PB-440	24		140	3/64	16	2	18	X
	PB-520	24		128	10/65	22	3	25	X
	703	16	12.7	20	10/67	135	20	155	11
	704	16	9.9		3/69	0	0	0	3
	706	16	19.0	36	5/69	15	3	18	15
Redcor Corp.	RC-70	16	12.9	29.4	7/68	85	0	85	70
	RC-77			111	1/70	-	-	-	
Rolm Corp.	1601	16	19	28	2/70	-	-	-	25
Sanders	200	16		72	3/69				
Scientific Control Corp.	650	12	14.8	20	5/66	23	0	23	X
	655		15.9	84	10/66	111	0	111	25
	660	24		84	10/65	27	0	27	12
	670	24		108	5/66	1	0	1	X
	4700	16	16.2	72	4/69	13	0	13	79
	DCT-32			12	11/69	0	0	0	3
	DCT-132			29	5/69	23	0	23	509
Spear	Microlinc			56.5					
Systems Engineering Labs	810	16	37.5	45	9/65	24	0	24	X
	810-A	16	18	36	8/66	158	4	162	49
	810-B	16	33.5	48	12/68	59	0	59	17
	840	24	65	80	11/65	3	0	3	X
	840-A	24	60	75	8/66	36	2	38	X
	840-MP	24	49	64	10/67	26	0	26	5
	86	32		325	5/70	-	-	-	1
	88	32		1000	11/70	-	-	-	0
Tempo Computers	1	16	13.8		9/69	2	0	2	
	1-A	16	24	29.6					
Transistor Electronics	TEC-520		13.8						
Unicomp	Comp-16	16	9.8			0	0	0	
	Comp-18	18				0	0	0	
Varian Data Machines	520 i	8/16	6.0	12.8	9/68	50	0	50	1000
	610	12		14.7	7/64	10	0	10	X
	611/612	12			9/65				X
	620	16		37	11/65	75	0	75	X
	620 i	16	9.9	20	7/67	700	40	740	100
	622 i	18	12	20	10/67	50	10	60	10
	R620 i	16/18	13	25	5/69	25	10	35	50
Viatron	2140	16	4.8		4/70	-	-	-	
	2150	16	9.6	16.2	4/70	-	-	-	
Westinghouse Electric Corp. - Prodac	50	14		23.3	8/64				X
	250 (S-2)	16		62	9/67				
	510/580	18		110	6/63				X
	2000	16	10	26.6	8/69				
Xerox Data	92	12		60	4/65	60	5	65	X
	910	24		80	8/62	168	15	183	X
	920	24	11	116	9/62	135	19	154	X
	925	24		120	12/64	20	2	22	X
	930	24		136	6/64	140	19	159	X
	Sigma-2	16		84	12/66	191	52	243	80
	Sigma-3	16	30	104	12/69	2	0	2	
	CE-16	16	8	12.6	6/69				
	CF-16	16	14.9	25	9/69				
					Totals	16,106	2,918	19,024	8,220

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February 2, - February 13, 1970

	1969-1970 High	1969-1970 Low	2 week Sales in 100's	2 week High	2 week Low	Last	2 week Net Change	2 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	85	47 3/4	1645	53 1/4	47 3/4	51 1/8	+ 1 1/8	+ 2.3
American R & D	99 1/2	44	2551	95 3/4	85 3/8	95 1/4	+ 7 1/4	+ 8.2
Ampex Corp.	49 7/8	32 1/2	1980	42 3/8	38 5/8	41 1/8	+ 3 1/8	+ 8.2
Bunker Ramo	17 5/8	9 1/2	2409	13 3/4	11 1/4	13	+ 1 3/8	+ 8.9
Burroughs	172 3/4	120 3/4	3055	158 7/8	143	154 1/2	--	--
Collins Radio	69 3/4	23 1/4	1051	27 1/8	23 1/4	23 1/4	- 1 3/4	- 7.0
Computer Sciences	34 3/4	19 1/2	9727	30 3/4	23 1/2	24 3/8	- 3 7/8	-13.8
Control Data	159 1/4	60 3/4	9072	75 1/2	60 3/4	66 1/4	- 6 3/4	- 9.3
Electronic Assoc.	25 1/4	8	333	9 1/4	8	8	- 3/4	- 8.6
General Electric	98 1/4	68 1/4	4776	73 7/8	68 1/4	68 7/8	- 3 1/2	- 4.8
Honeywell	157 1/4	107 3/4	1663	140 1/4	129 1/4	134 1/2	- 2	- 1.5
IBM	387	291 3/4	3508	355	334 3/4	349	+13 3/4	+ 4.2
ITT	60 1/2	46 1/4	4258	57 7/8	54 5/8	56 1/4	+ 1 1/2	+ 2.7
Leasco	54	19	1628	22 1/2	19 1/2	19 1/2	- 1/4	- 1.3
Litton	74 1/2	24 3/8	5312	30 1/4	25 1/2	29	+ 4	+16.0
Memorex	173 7/8	65	7664	149	106 1/2	129 1/2	-15	-10.4
National Cash Register	171 3/4	108	1931	148 3/4	135 3/4	146 1/2	+10 1/2	+ 7.7
Planning Research	53 1/4	23 7/8	1156	48 1/2	42 1/2	47 3/4	+ 4 7/8	+11.4
RCA	48 1/8	29 1/4	3769	31 7/8	29 1/4	29 7/8	- 3/8	- 1.1
Raytheon	50 1/4	26 1/2	6151	31	26 7/8	27 3/4	+ 1 1/4	+ 4.7
SCM	47 1/8	18 3/4	996	20 1/4	18 3/4	18 7/8	- 1/4	- 1.3
Sanders	61 7/8	20	769	22 7/8	20	20 1/8	- 1 7/8	- 8.5
Sangamo	43 1/2	19 1/4	894	29 1/8	24 3/4	28 1/2	+ 3 1/2	+14.0
Singer	87 7/8	62	1092	80 1/2	75	76 1/8	- 1	- 1.3
Sperry Rand	55 1/2	34 1/4	4452	37 3/8	34 1/4	34 1/2	+ 1/8	+ 0.4
Teledyne	45 1/2	25	4554	29 5/8	25	26 1/4	- 2 3/8	- 8.3
Telex	159 1/2	20 3/4	12873	146 3/4	106	135	- 6 3/4	- 4.8
University Computing	111 1/2	53 1/4	4512	65 7/8	53 1/4	62 7/8	+ 5/8	+ 1.0
Xerox	115 3/4	85 1/4	5183	104 7/8	97 1/8	97 3/4	- 2 7/8	- 2.9
NYSE COMPUTER STOCK AVERAGE							+ 0.1	+ 0.2
AMERICAN STOCK EXCHANGE								
Applied Data Research	32 7/8	17 1/2	204	20 1/2	17 1/2	17 1/2	- 3	-14.6
Automatic DP	47 3/4	34 1/8	1816	46	40 3/4	45 3/8	+ 2 1/8	+ 4.9
Calcomp	37 1/2	18 1/4	920	28 3/4	23 1/4	28 3/8	+ 5 1/8	+22.0
Clary Corp.	25 3/4	7 7/8	118	8 7/8	8 1/8	8 1/8	- 1/8	- 1.5
Computer Applications	21 7/8	6	362	9	7 1/4	8 1/8	+ 5/8	+ 8.3
Computing and Software	75 3/4	37	887	73 1/2	66 1/8	68 1/2	- 1/8	- 0.2
DPA, Inc.	13 5/8	7 3/4	217	8 1/2	7 3/4	7 3/4	- 1/4	- 3.1
Data Proc. Fin. & Gen.	60 1/4	22	1137	24 7/8	22 1/4	22 7/8	+ 5/8	+ 2.8
Data Products	27 7/8	12 3/8	2480	22	19 3/8	20 3/4	+ 1	+ 5.1
Digital Equipment	124	54 1/2	1730	123 1/2	109	121 7/8	+ 9 7/8	+ 8.6
Granite Mgt.	45 1/2	14 1/4	253	18	14 3/4	16 1/8	+ 1 7/8	+14.2
Greyhound Computer	28 5/8	11 1/2	175	12 3/8	11 1/2	11 5/8	+ 1/8	+ 1.1
ITEL	37 5/8	14 1/4	1034	21 3/8	18 3/4	20 1/8	+ 3/4	+ 3.9
Levin-Townsend Comp.	57 1/2	10	1146	14 3/8	10	11 1/8	- 1 1/4	-10.1
Milgo Elect.	84 1/2	17 7/8	7611	78 1/2	64 1/8	71 1/2	- 1 3/8	- 1.9
Mohawk Data Sciences	89 1/8	59 3/4	3432	79 1/2	68 1/2	76 7/8	+ 1 7/8	+ 2.5
Potter Instrument	46	23 3/4	1623	36 1/8	30	35 3/8	+ 4 5/8	+15.0
Sys. Eng. Labs.	53 7/8	26 1/8	1627	44 7/8	38 1/2	43 1/4	+ 4	+10.2
AMSE COMPUTER STOCK AVERAGE							+ 1.5	+ 3.7

	1969-1970 High Bid	1969-1970 Low Bid	February 13, Bid	February 13, Asked	2 weeks ago Bid	2 week net change Bid	2 week % change Bid
OVER-THE-COUNTER							
Aries Corp.	19	3 5/8	4 1/4	5	3 5/8	+ 5/8	+ 8.9
Bolt, Beranek & Newman, Inc.	19	7 1/2	9 3/4	10 1/2	8 1/2	+ 1 1/4	+11.9
Computer Usage	40	5 1/4	7	7 3/4	6	+ 1	+13.8
Cyber-tronics	15	7	13	13 3/4	12 3/4	+ 1/4	+ 1.7
Digitronics	22 1/2	12 1/2	12 3/4	13 3/4	13	- 1/4	- 2.0
Fabri-Tek	12 7/8	5 5/8	7	7 1/2	6 1/2	+ 1/2	+ 6.1
Informatics, Inc.	30 1/4	11 3/4	15 1/4	16	16	- 3/4	- 3.9
LMC Data, Inc.	8 1/4	1 3/4	2 5/8	3 1/8	2 3/4	- 1/8	- 3.9
Management Assistance	14 7/8	2 1/8	3 3/8	3 5/8	3	+ 3/8	+10.4
Optical Scanning Corp.	118	40	46	49	40	+ 6	+11.8
Recognition Equipment, Inc.	83 1/2	52	71	72	66 1/2	+ 4 1/2	+ 5.4
TBS Computer Centers Corp.	36	11	24	25	23 1/2	+ 1/2	+ 2.4
Tally Corp.	36	15	19	20 1/2	18 1/2	+ 1/2	+ 2.6

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REVIEW AND FORECAST

E|D|P industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MARCH 25,1969 • VOL.4,NO.14 P.J.McGOVERN,EDITOR

A very interim year

1968 COMPUTER SHIPMENTS EXCEED EXPECTATIONS; EDP INDUSTRY FACES NEW GROUNDRULES IN 1969

With almost predictable disregard for previous forecasts, 1968 turned out to be a better year than expected for the computer industry. Indeed, total shipments worldwide, up some 22%, were better than anticipated even at midyear (EDP/IR July 31,1968), yet, as we pointed out at that time, the industry seems to be settling down to its normal, long-range explosive growth rate. Unlike other years for the computer industry, however, 1968 ended with more than just superlatives; as 1969 gets started, it's clear that there are significant transitions occuring in the EDP market. Here are highlights from the year just past:

- Shipments of new computer equipment, by American manufacturers, jumped to $7.2 billion, a healthy 22% increase over last year's impressive $5.9 billion. The rate of growth, indeed, slowed down . . . but not so much as anticipated a year ago.

- Although dollar value of worldwide shipments were up more than anticipated, the number of computer systems shipped actually decreased. It was down 21.4% to 14,700. Reasons for this are: (1) substantial deliveries of large systems announced several years ago but just now moving off the shipping docks; (2) significant amounts of add-on equipment (up to 40% of total shipments for some companies) for expansion of existing installations; and (3) massive replacements of second-generation computers with fewer third-generation models.

- The total computer industry -- including special-purpose computers, software, computing services, and supplies as well as general-purpose digital systems -- reached the $11.3 billion level. Unlike the situation in previous years, this total figure increased by approximately the same percentage as did computer systems alone, suggesting the tightening links between different sections of the market that lead EDP/IR to suggest last year that 1968 would be the year of synergism, with independent industry segments interacting for added effect.

- The role of purchases by third-party leasing companies was even more significant during 1968 than previously. The more than $1 billion worth of computers purchased from IBM, in fact, accounted for such a boost in IBM's profit levels that the company may not be able to sustain the same rate during 1969.

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- Minicomputers and time sharing came into their own. At the spring and fall joint computer conferences, minicomputers, remote terminals, and new on-line services were being announced all over the place.

- As 1968 ended and 1969 began, the industry knew it should begin to look at itself and at its business in the light of a whole new set of guidelines. IBM announced that during the first part of 1969 it would announce a new pricing structure for its equipment and services; then . . . zapp! bang! poww! . . . Control Data, DPF&G (the leasing company) and the Justice Department filed antitrust suits against IBM.

- Retirements of installed computer systems shot up sharply in 1969. During the year, the value of installed American-made computers increased $5.1 billion net, with the other $2.1 billion of shipments cancelled by equipment returned from the marketplace. This 29% retirements/shipments ratio is up significantly from the 9% reflected in last year's figures.

The trends that were started during 1968 -- especially the litigation that was introduced and the separate pricing it implies -- mean that the industry faces the next several years in an atmosphere of uncertainty. Industry growth will not change significantly because of the new rules, but the structure of the industry may very well indeed. For this reason, we have had to treat our forecasts in a different light.

SHIPMENTS, BY MANUFACTURER, IN 1968

All of the major mainframe manufacturers had increases in the value of computer shipments last year, though three in particular explain much of what happened. CDC, with a 53% gain in shipments over 1967, illustrates the importance of large computers in last year's shipments. IBM with a 21% increase, just below the industry average, had significantly increased add-on as well as an increase in shipments of large computers. Honeywell, with a smaller increase, had well over one-third of its new business in add-on. The table below -- based on estimates by the International Data Corporation, publisher of EDP/IR -- contains estimates of computer shipments by principal American computer manufacturers during 1968. The figures reflect worldwide shipments of newly produced computer systems as well as new core memory and peripheral equipment added-on to existing systems; they do not include replaced equipment refurbished and shipped to new customers.

Company	Shipments in $ millions	Percentage
International Business Machines	$5200	72.2%
Univac	380	5.3
Honeywell	340	4.7
Control Data Corporation	305	4.2
General Electric	280	3.9
Radio Corporation of America	225	3.1
Burroughs	170	2.4
National Cash Register	170	2.4
Scientific Data Systems	75	1.0
Digital Equipment Corporation	35	0.5
Others	20	0.3
	$7200	100.0

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OUTLOOK FOR THE COMPUTER INDUSTRY

There are many and varied reasons for the relative success of each of the ten major computer manufacturers during 1968, and each of them has both strengths and weaknesses as it faces 1969 and the 1970s. It must be remembered, however, that IBM has shipment levels that range from 10 to over 100 times those of its competitors. As a result, the moves made by IBM play an important role in setting the environment within which other manufacturers create their opportunities. To give perspective to the current outlook, EDP/IR will first review IBM, the major force in the industry. We will then give our review and outlook for each of the other leading manufacturers of electronic data processing equipment.

The role and outlook of IBM in the industry

A computer industry outlook always depends crucially on the outlook for IBM. But in looking ahead toward 1969 and the early 1970s, the directions that IBM may follow take on increasing importance. There are two key reasons for this:

- The year 1969 marks the fifth anniversary of the announcement of IBM's System/360 -- as well as many other "third-generation" computers -- and if "traditional" considerations of a five-year product cycle for computer generations were to be followed, this year would see many product announcements. The introduction of major new systems in 1969 is unlikely, however, so there will be a break in the historical pattern of computer generations in the industry.

- During late 1968, IBM -- almost as if it knew what was coming -- announced that by mid-1969 it would publish new policies on its pricing of computer products and services. Then, only a few days later, came the first of three law suits whose settlements -- if nothing else -- will define the nature of the computer industry through the 1970s and into the 1980s . . . perhaps into an age of maturity and tradition.

With the uncertainty of the outcome of these, it is difficult to make projections. Therefore, EDP/IR's forecast for specific manufacturers -- and for the industry -- is made on the premise that current marketing policies will continue. Indeed, this will likely be the situation for the next three to six or more years, and the outlook for mainframe manufacturers will be affected far less by changes than will that of the other companies within the computer industry. These will be discussed later.

Separate pricing, of some sort, is almost certain

In looking ahead, it seems almost a certainty that the industry will see some form of separate pricing. IBM currently is weighing the extent to which it wants -- or needs -- to anticipate the requirements that almost certainly would be contained in a consent decree . . . the outcome of the Justice suit expected by EDP/IR and industry experts to whom we have talked. IBM will probably introduce a modified plan that, among other things, will enable it to gage the attitude and response of the computer user himself. (EDP/IR currently is conducting a survey on this matter, and will report it in the next issue.)

Whatever is done in the immediate future -- indeed, whatever is done in the long range -- it is EDP/IR's opinion that IBM will almost certainly not lose, and that it will probably gain. We also think that -- with the possible exception of

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the independent software companies which may gain increased opportunities -- other segments of the computer industry will experience either no, or a negative effect. And we feel certain that the computer user will end up spending as much or more than he does today for equivalent computer services.

In the interim, what?

During 1969 and the early 1970s, EDP/IR expects IBM to continue business as usual . . . implementing the changes it already had planned. Items to look for stack up as follows:

- Pricing -- IBM likely, this spring, will announce a modified pricing structure that will start to break out customer costs for hardware, software, custom customer support, education, maintenance, and the like. A few of its customers -- perhaps as many as 20% -- may take advantage of independent sources for portions of their support.

- New Products -- As pointed out in the last issue, the "3.7's" introduction is imminent. This terminal-type computer will primarily impact punched-card equipment users and, in addition, will be a valuable add-on consideration for organizations with large computer systems. In addition, after the pricing announcement, IBM is expected to announce the 360/35 and 360/45. These transition generation machines will give new, communications-oriented growth possibilities to present-day 360/30 and 360/40 users. Several products must be expected, since most 360s are on a "limited new production" basis, and the larger 360/50s and 360/65s have a firm 18 month delivery schedule. IBM's industrial machine must be kept oiled and running, lest it rust.

- Growth -- Following the tremendous increase in -- and inherent spurt in profits from -- purchases of computers by third-party leasing companies during 1968, IBM may well follow through its prediction for declines in profits -- or profit growth -- for 1969. In the words of one industry observer: "This may be the year for IBM to get the air bubble out of its gas line" . . . and tool up for the early 1970s.

IBM's outlook

All in all, as the accompanying tables show, EDP/IR is projecting only a 15% growth in industry shipments for 1969. And if Burroughs, NCR, and other companies experience the shipment growth their backlogs would indicate, IBM could well see a year of shipment growth in the 12% area. There is only one drawback: IBM is virtually committed to a 15% to 17% profit growth, so a corresponding shipment growth is indicated. Several production lines have been curtailed for several months, and it could be that when IBM announces its new products it will demonstrate them as well . . . and announce that they will have very short delivery schedules.

Individual outlook for 1969, by manufacturer

With the general outlook for IBM, and therefore for the industry, in mind, we present in the following section our individual outlooks for the other major manufacturers that -- along with IBM -- constitute the mainframe sector of the computer industry:

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Burroughs. According to the numbers, things are looking very well. Burroughs had the largest percentage growth in shipments of any manufacturer, and at yearend, its on-order position was exceeded only by those of IBM and Univac. This is factual proof of the general industry feeling that this company's success is based on a well-developed and supported product line. The delivery of effective software on a timely basis has contributed a lot to the success of the 500 series. Users report very efficient higher-level languages and better throughput than on many competitive models.

On the lower side of this series, the B3500 has been accepted for delivery under the Air Force Phase II contract, and this "vote of confidence" shouldn't be harmful to Burroughs salesmen. At the upper end of the line, the B6500 and B7500 seem to be getting quite good acceptance, especially as B5500 users want to upgrade this computer upon which the series is built. Only the superscale B8500 -- as it was a year ago -- is still a question mark. The company says it intends to make the computer a reality, but customers are losing faith and we can only wait and see. Perhaps it will be "fixed" by the time B6500 and B7500 customers need to upgrade.

At the terminal level -- a rapidly growing portion of the computer equipment market -- Burroughs seems to be sitting pretty. The acceptance of the TC-500 is good, and volume deliveries should begin this year. Also, Burroughs seems to be testing the air for the prospect of separate pricing. In introducing the L2000 accounting "computer," the company announced that software would be priced separately from hardware. It would appear that Burroughs is getting ready and field testing what seems the inevitable . . . separate pricing of hardware and software. At least it will have some understanding of what customers think of the concept.

Control Data. Considering the merger with Commercial Credit Corp., the acceptance and continued delivery of the 6000 series, the "unveiling" and first delivery of the superscale 7600, and the establishment of Cybernet on-line computing service, CDC obviously had a good year. In addition, it was the first of the three parties to bring antitrust action against IBM. In a nutshell, the news from Minneapolis is good. CDC is no longer "the only major manufacturer so heavily dependent on computers for revenue," as we described it last year. Also, it now has the "bank" so necessary to success in the computer business.

In the hardware area, the company continues to be a major supplier of computer peripheral equipment and terminals, and therefore has a large OEM market. Also, although competition has increased during the last year, it is still a major supplier of disk packs for its own and for IBM drives. CDC is having a brisk market for its extended core memories for its 6000 series machines; and it is expected to introduce, soon, a radically new "chain type" line printer. There may be problems in moving the 7600 to a production line basis, but since the computer is made from mass-produced modules, these should not be too great. And, plans are well along for using these modules in a whole new line of peripheral computers for the mid 1970s.

With the additional capital available through Commercial Credit, CDC can be expected to move more rapidly into business-oriented data processing. Much of this growth could come through its Cybernet, which is currently promoting the use of CDC remote batch terminals as "windows into the 6600." The sales force expects that some Cybernet customers will gradually find it more economical to install their own 6000 series computer.

Digital Equipment Corp. "The minicomputer market is booming, and DEC is the giant." That's what we said a year ago, and no more accurate phrase could sum up the out-look for DEC again this year. Shipments of minicomputers -- those

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general-purpose digital computers that sell for $25,000 or less -- should double again during 1969 to over $100 million; and despite the many new companies that have entered this field, DEC is expected to maintain its position in this sub-market similar to that of IBM in the total market.

In addition, Digital is making inroads into the time-sharing market with its PDP-10, a computer currently being delivered at rates of three or four a month. Also, the company is looking upon the minicomputer as more than just a processor. It is developing specialized applications packages to give it entree into new industries, and is working hard toward producing a complete line of miniperipherals, devices that not only will make minicomputers more effective but also that will increase the average value of a system at a time when central processor costs are plummeting.

General Electric. Thanks largely to deliveries abroad -- which are greater now than those in the U.S. -- GE showed a 17% increase in shipments, nearly up to the industry average, last year. And with the exception of the Olivetti-developed 115, almost all these shipments were of machines that have been around for several years. GE should be one of the first companies to introduce a major new line of computers, and a management change late in 1968 seems oriented in this direction.

So far, GE has continued its lead in time sharing, and continues to expand both in the U.S. and abroad. It currently has about 40% of this country's computational time-sharing business, and an even greater share abroad. Its leadership here, however, is threatened by at least three factors: 1) GE's 265 equipment is old and inefficient in its use of mass memory; therefore it may be the first service to suffer from price competition. The Mark II service, operating from 635 computers, gives GE a third-generation entry into this market, however. 2) There is a trend toward the use of on-line computer networks to sell specialized programs and data bases . . . GE was one of the first companies, in fact, to recognize this and adjust prices accordingly. But there is some question that GE, with its sales force and older equipment, can take full advantage of this trend. 3) More and more computer users are realizing the increased amounts they are paying for computational time sharing and are purchasing small, dedicated systems for in-house use. To offset this trend, we understand, GE is developing a new small-scale time-sharing product line.

Over all, there continues to be the question of whether or not GE understands the computer business. It is committed to it, and will be in for the long haul . . . in one way or another. But, it seems, each time it recognizes the need to bring computer industry people into management, and obtains them, it turns around and gives higher level control to old-line company men. Despite the management changes made recently, it still will be very interesting to see whether GE can successfully apply traditional business management principles to the computer industry.

Honeywell. Despite the fact that it had the smallest increase in shipments last year (6%), Honeywell may well be the nearest thing there is to The Other Computer Company, as it describes itself in its current advertising series. It has the second largest base of general-purpose, third-generation computer systems, and during the last year or so it has added many of the features that contribute to a total systems capability. Last year it introduced a line of disk packs and drives, introduced the Keytape; early this year, it has introduced a time-sharing computer, started deliveries of medium-to-large-scale computers, announced a time-sharing and service bureau network, brought out its first minicomputer, and hinted at plans for going into software and education.

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Honeywell's equipment, on the other hand, is the oldest of the third-generation families -- with the H200 announced more than five years ago -- and there is certainly much development work being done toward its next series of computers. But the 200 series continues to move, and the more than $1 billion worth of third-generation equipment currently installed represents a valuable base for add-on sales each year. Honeywell is profitable in its computer operations, and perhaps its reduced new system shipments this year represents a plan to insure that the profits from this base are realized.

For these reasons, Honeywell is not expected to announce a complete new family of computers, although a transition model or two may well be expected. Emphasis by the company's Computer and Communications Division will be to continue add-on sales, to bring new users into its fold, to increase its activities in the supplies and peripherals fields, to venture into the minicomputer market, to establish its Information Services Div. (within which its time-sharing centers operate), and to move ahead in the terminal area. Its new line equipment -- expected to be program compatible with the IBM System/360 computers and microprogram compatible with the Series 200 machines -- will, however, probably be the first announced by a major manufacturer . . . announcement is not expected before 1970, and because of recent internal delays, will probably not come before 1971.

National Cash Register. As predicted, the Century Series (see the 615) was the most thoroughly prepared-for announcement of the 1960s, and initial acceptance would indicate that this transition generation machine will equal or surpass the company's initial predictions. The company's yearend backlog is above the value of its 1968 shipments. Industry observers concede that NCR has latched onto an attractive product line giving basic yet capable service to smaller organizations, and they expect continued success for this manufacturer.

To supply customers with a full line of computer system equipment, NCR has chosen the route of offering peripherals, terminals, and software from other sources. The apparent philosophy is that only so much capital can be committed, and when the best in this area cannot be developed in-house, it is better to select the desired product from an outside supplier. With NCR already committing so much of its resources to support of the Century, this may well prove to be the most practical method.

RCA. With a shipment increase of 29%, RCA continues to stay abreast, or slightly ahead, of the industry in general and steadily to build the base for a profitable computer business in the 1970s. It has limited objectives in the marketplace until 1971-1972, although the Spectra series of machines are being well accepted in a communications environment.

For the mid-1970s, RCA's computer line is expected to be heavily composed of software-in-hardware components (as is IBM's) and is seen to be oriented toward time sharing and other on-line computer applications. RCA is also making strong commitments to the area of computer applications in the education and the graphic art field.

SDS. With shipments up 42% last year, SDS has finally captured one percent of the computer market. Its 940 computer is one of the standard machines used by time-sharing services, and it looks as if its Sigma 7 will be an adequate entry into communications-oriented markets. These facts, however, are relatively unimportant in light of the impending merger of SDS with Xerox.

SDS already has the goal of bringing its product to the commercial field, rather than to the specialized user. And there is talk that Xerox plans a diversified computer service to compliment its office and business systems

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capability. Other mergers are being talked about. By this time next year (if not before), we look forward to discussing the role of Xerox in the computer industry.

Univac. Ranked number two company in terms of value of installed computers or of shipments, Univac still presents its traditional face . . . but there is good evidence that the face is changing. Shipments of the 1108 -- the computer that by chance or design has become almost a standard in the large-scale scientific market -- continue to be impressive, and as a result total shipments were up 12% last year. The general analysis of Univac is that it has excellent engineering but that its weakest link is in the area of sales and customer support . . . especially in the small-scale area to which the 9000 series machines are oriented.

There is a chance that a change in these traditional criticisms is on the horizon. There has been a sharp improvement in management. Also, this portion of Sperry Rand has shown signs of branching out: It seems to be spreading its operating base through the establishment of on-line service bureaus and the addition of more peripheral equipment to its product line.

Univac's orders in the large machine category are up significantly, and offset a reduced percentage of those in the small class, which have dropped to less than one-third of on-order business, and in the medium class, which is virtually nonexistent. One new product on the horizon is the 1106, a computer that is completely compatible with the 1108 and that offers about two-thirds the capability at about one-half the price. This, with a new series of terminal computers based on the D-2000, could well spell out Univac's product line during the next few years.

A HISTORY, PROJECTION, AND ANALYSIS OF THE COMPUTER INDUSTRY THROUGH 1975

With the computer industry at perhaps its first "critical point," EDP/IR has changed, slightly, the manner in which it makes its projections. In most cases, we have kept the historical format -- as used in previous Review and Forecast issure -- and projected in a similar manner through 1970; in others, we have changed the definition of the various submarkets, and have adjusted our historical figures to more nearly reflect the new definitions.

During the past year, and especially since yearend, we have undergone an extensive updating of our continuing computer industry study that measures the current and expected annual sized of the principal sectors of the industry. This year, we have enlarged our sector analysis from five to six, and slightly redefined some of them. The six principal sectors now included (Table I) are: (1) General-purpose digital computers, (2) Special-purpose computers, (3) Independent peripheral equipment, (4) Contract and packaged software, (5) Computing and data processing services, and (6) Data processing supplies. Below is a discussion of each of these sectors and the type of companies that participate in each:

General-purpose digital computers, the mainstream of the computer industry, includes the ten major manufacturers discussed previously plus such companies as Standard Computers and Systems Engineering Laboratories that contribute to the output of general-purpose computers valued above $25,000. This is the major segment of the computer industry.

Special-purpose computers includes leading manufacturers of analog and digital computers generally used in special-purpose systems, such as in military guidance systems. Also included in this category are manu-

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TABLE I ESTIMATED AND PROJECTED ANNUAL VALUE OF COMPUTER EQUIPMENT SHIPPED BY AMERICAN MANUFACTURERS AND THE ANNUAL SIZE OF THE RELATED PERIPHERAL EQUIPMENT, SOFTWARE, AND SERVICES MARKET
(Values in $Millions; Equipment values calculated as purchase price of systems when shipped)

Year	General Purpose Digital Computers	Special Purpose Computers	Independent* Peripheral Equipment	Contract and Packaged Software	Computing and Data Processing Services	Data Processing Supplies	Total
1955	$ 75	$ 80	$ 14	$ 15		$ 155	$ 339
1956	140	210	25	20		175	570
1957	240	350	35	25		195	845
1958	460	450	50	40		230	1230
1959	600	650	75	90		270	1685
1960	720	900	105	125		370	2220
1961	1100	1100	110	180		485	2975
1962	1400	1300	130	220		530	3580
1963	1800	1300	145	$ 5	$ 265	595	4110
1964	2200	1200	170	20	300	630	4520
1965	2400	1250	175	50	400	660	4935
1966	3660	1400	185	100	500	740	6585
1967	5900	1610	225	175	600	850	9360
1968	7200	1850	300	270	720	960	11,300
1969	8200-8400	2050-2150	375- 425	350- 450	800- 900	1050-1150	12,825-13,475
1971	10,500-11,100	2400-2600	625- 725	600- 800	1000-1200	1200-1350	16,325-17,775
1973	14,900-15,900	3000-3200	900-1100	1000-1200	1350-1650	1300-1500	22,450-24,550
1975	19,400-20,400	3850-4150	1400-1600	1500-2000	1800-2200	1500-1700	29,450-32,050

* Part of this equipment is sold to computer manufacturers.

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TABLE II WORLDWIDE ANALYSIS OF GENERAL-PURPOSE DIGITAL COMPUTERS MADE BY U.S. FIRMS
(Values, in $Millions, calculated as purchase price of systems when shipped)

Year	No. of Systems Shipped	Cumulative Net Systems Installed (Yearend)	Value of Computer Equipment Shipped	Cumulative Net Value Installed (Yearend)	Cumulative Customer Installation Sites (Yearend)
1955	150	250	$ 65	$ 180	190
1956	600	800	170	340	575
1957	1000	1700	280	600	1100
1958	1400	2950	460	1035	1900
1959	1700	4500	600	1600	2900
1960	2200	6500	720	2265	4000
1961	3400	9300	1100	3265	5400
1962	4500	12,600	1400	4515	7400
1963	5600	16,800	1710	5975	9600
1964	7500	24,000	2200	7925	14,000
1965	7400	31,000	2400	10,100	17,000
1966	10,200	40,600	3660	13,500	22,000
1967	18,700	57,600	5900	18,900	27,000
1968	14,700	69,400	7200	24,500	32,000
1969	15,000-15,800	79,500-81,000	8200-8400	30,500-31,500	37,500-38,500
1970	17,400-18,400	92,000-94,000	9150-9450	37,500-39,000	43,500-45,000

facturers of minicomputers (those that sell below $25,000) and analog computers. By 1975, this type of equipment will tend to be the same as that used in general-purpose systems, but with specific micrologic elements that optimize it for a particular application area. Also, it should be noted that minicomputers, although general-purpose in nature, will increasingly be used to take over special-purpose duties for general-purpose systems, such as communications handling. The low unit cost of minicomputers will tend to reduce the average system value of computers included in this category.

Independent peripheral equipment includes leading manufacturers of all the peripheral equipment used with computers. Examples are paper tape and punched card handling equipment, magnetic tape transports, disk pack drives, mass storage units, core memories, high-speed printers, graphic displays, data transmission units, and on-line terminals. The latter is one of the fastest growing of the computer industry submarkets, and the easiest entered by "outsiders," since the common communications line interface to the terminal provides independence from system control by the mainframe manufacturer.

Contract and packages software, a new category in this year's forecast, includes the companies that supply programming services or software to computer manufacturers and users, firms offering software packages for sale, and consulting services that essentially develop software for clients. Already, there is a hazy difference between firms that offer these services and the companies that offer specialized Rair (remote access/immediate response) services over communications networks.

Computing and data processing services includes firms that offer computing on a service bureau basis, those that provide remote batch processing, and those that offer Rair or time-sharing services.

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TABLE III GENERAL-PURPOSE DIGITAL COMPUTERS, MADE BY U.S. FIRMS, INSTALLED WITHIN THE U.S.
(Values, in $ Millions, calculated as purchase price of systems when shipped)

Year	No. of Systems Shipped	Cumulative Net Systems Installed (Yearend)	Value of Computer Equipment Shipped	Cumulative Net Value Installed (Yearend)	Cumulative Customer Installation Sites (Yearend)
1955	145	244	$ 63	$ 177	$ 185
1956	550	746	156	324	533
1957	850	1500	240	547	930
1958	1180	2550	395	923	1575
1959	1395	3810	495	1390	2380
1960	1790	5400	590	1937	3210
1961	2700	7550	880	2715	4195
1962	3470	9900	1090	3620	5590
1963	4200	12,850	1300	4720	7050
1964	5600	18,200	1670	6105	9875
1965	5350	23,200	1770	7655	12,275
1966	7250	29,800	2640	10,030	15,650
1967	11,200	40,100	3900	13,600	18,400
1968	9100	47,100	4800	17,350	20,400
1969	9100-9800	53,000-54,000	5270-5370	21,100-21,850	22,500-23,300
1970	10,500-11,200	60,300-61,800	5700-5850	25,200-26,300	25,000-26,200

Data processing supplies includes companies that sell expendable data processing supplies such as paper tape, punched cards, magnetic tape, business forms, disk packs, and the like. This sector also includes such emerging supply areas as microfilm when it is used for output in a computer system.

Explanation of tables

The results of our new computer industry analysis are shown in Tables I - V. Table I shows our estimates of the annual market sizes of the six principal sectors of the computer industry between 1955 and 1968, and our projections of the annual market size of each during the period from 1969 through 1975.

In Table II, we show the estimated and expected number of computer systems shipped each year by the American-based computer manufacturers. The value of these shipments is calculated for comparison. For each year in the study we have presented our estimate of the net cumulative number and value of American-made systems installed throughout the world. Also, to emphasize the changing character of the computer marketplace, we have indicated the number of customer sites at which these computers are used.

In Tables III and IV, we have broken down the information from Table II into its domestic and foreign segments. The differences in the two illustrate the past and expected future changing character of the two markets.

Because of the changing character of computer systems, and of what can be actually classified as a computer, we have looked at the future -- in Table V -- in terms of dollar value and the distribution of this value between the U.S. and abroad. In making estimates beyond 1970, we do not feel it is meaningful to estimate the "number of systems" shipped or installed, since redistribution of computer power to terminals and large complexes makes number counting a semantic exercise.

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TABLE IV GENERAL-PURPOSE DIGITAL COMPUTERS, MADE BY U.S. FIRMS, INSTALLED OUTSIDE THE U.S.
(Values, in $ Millions, calculated as purchase price of systems when shipped)

Year	No. of Systems Shipped	Cumulative Net Systems Installed (Yearend)	Value of Computer Equipment Shipped	Cumulative Net Value Installed (Yearend)	Cumulative Customer Installation Sites (Yearend)
1955	5	6	$ 2	$ 3	5
1956	50	54	14	16	42
1957	150	200	40	53	170
1958	220	400	65	112	325
1959	305	690	105	210	520
1960	410	1100	130	328	790
1961	700	1750	220	550	1205
1962	1030	2700	310	895	1810
1963	1400	3950	410	1255	2550
1964	1900	5800	530	1820	3625
1965	2050	7800	630	2445	4725
1966	2950	10,800	1020	3470	6350
1967	7500	17,500	2000	5300	8600
1968	5600	22,300	2400	7150	11,600
1969	5800-6000	26,200-27,200	2930-3030	9400-9650	14,800-15,400
1970	6900-7400	31,200-33,200	3450-3600	12,300-12,700	18,300-19,300

Computer systems during the next five years

This redistribution of computer power is evident is the accompanying bar charts. Both these show percentage distribution based on cumulative net value of computer equipment installed (Chart I) or worldwide new computer system shipments by American manufacturers (Chart II). Naturally, therefore, the base for each succeeding year is larger than previous ones.

Chart I shows the distribution of installed computers by size, based on rental prices. At the end of 1967, more than half the computers installed (by value) were in Class II -- the medium-priced computer such as the 360/30, the H-200, or the B-300. The rapid growth in large-scale computers is quite evident, as is the growth in small computers. These small computers may often be used as terminals to complexes of large or super-scale computers.

Chart II shows how each $1000 of computer rental is expected to be distributed among the four major types of equipment that are found in a computer system -- central processors (logic and main memory); CPU-coupled input/output devices (such as card reader/punches, line printers, optical character recognition equipment, or console typewriters); external memory units (such as magnetic tape drives, disk pack drives, drums, or bulk core storage); and remote terminals (such as teletypewriters, cathode ray tube displays, or remote card or paper tape readers).

The shifting patterns of growth in the computer industry are most apparent from Chart II. The value of the central processor in the total system is continually declining, as is that of the input/output equipment attached to it. The portion of external memory in a system is expected to increase slightly over the next five years, and could grow even more by the mid-1970s if certain techniques now being tried in the laboratories can be brought to commercial status. The last set of bar graphs in this projection of hardware in the computer industry show the area in which the greatest growth is expected -- remote terminals.

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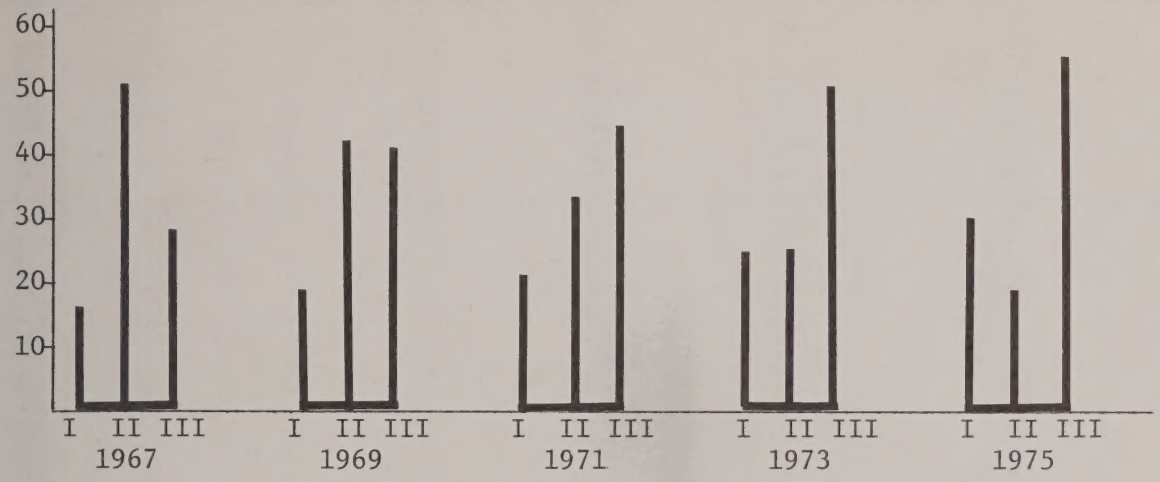
TABLE V FUTURE DISTRIBUTION OF GENERAL-PURPOSE DIGITAL COMPUTERS MADE BY U.S. FIRMS
(Values, in $ Millions, calculated as purchase price of systems when shipped)

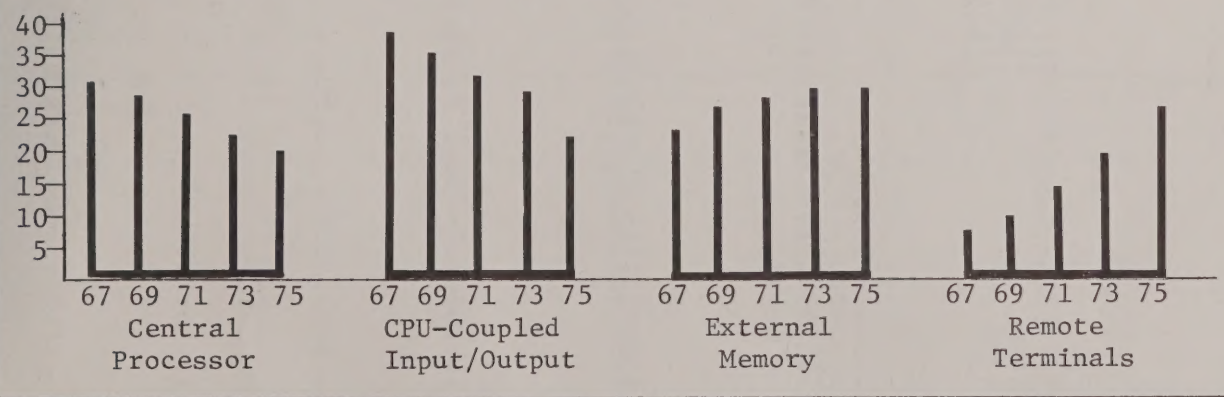
	Value of Computer Equipment Shipped			Cumulative Net Value Installed (Yearend)		
Year	U.S.	Outside U.S.	Worldwide	U.S.	Outside U.S.	Worldwide
1969	$ 5270-5370	$ 2930-3030	$ 8200-8400	$21,100-21,850	$ 9400-9650	$30,500-31,500
1971	6390-6770	4110-4330	10,500-11,100	29,500-30,800	15,900-16,600	45,400-47,400
1973	9040-9600	5860-6300	14,900-15,900	39,800-41,300	25,200-26,700	65,000-68,000
1975	10,400-10,600	9000-9800	19,400-20,400	54,000-54,400	38,000-42,000	92,000-96,400

Chart I ESTIMATED DISTRIBUTION OF INSTALLED COMPUTERS BY CLASS
(Shown as percent of value installed worldwide, by year)



Class I -- Monthly rental of $500 - $5,000
Class II -- Monthly rental of $5,000 - $20,000
Class III -- Monthly rental of $20,000 and up

Chart II DISTRIBUTION OF COMPUTER SHIPMENT VALUE BY MAJOR SYSTEM COMPONENT
(Shown as percent of worldwide shipments, by year)



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MONTHLY COMPUTER CENSUS

The number of electronic computers installed or on order at any one time has been increasing rapidly during the past several years. New models come on the computer market, familiar machines go out of production and subsequently are sold on the used machine market or retired from active use and dismantled. Some computers have been received with open arms by users; others have been given the cold shoulder.

To aid our readers in keeping up with this rapidly changing profile of computer use, **EDP Industry Report** publishes this census, with the status of general-purpose electronic digital computers, made by U.S.-based companies, as of the first of each month. Computers with an average system purchase price of less than $25,000 are not included. The figures for total installations are broken down between those in the U.S. and those outside; only the grand total for orders is given. The figures are compiled and updated each month by the International Data Corporation, Newtonville, Mass., a market research firm that specializes in the information processing industry. The census is available only in **EDP/IR.**

In general, manufacturers in the computer industry do not *officially* release installation and on-order figures. The figures in this census are developed through a continuing market survey conducted by the International Data Corporation. The market research program includes a worldwide computer installation locator file which identifies, by customer, the installation sites of electronic computers. The resulting census counts are submitted to individual computer manufacturers for their review and voluntary confirmation.

We hope the figures in this census will serve as a useful "box-score" of progress for readers interested in following the growth of the U.S. computer industry and of the computing power it builds. Comments from readers are welcome.

AS OF JANUARY 1, 1969

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	205	$ 4,600	1/54	22	3	25	X
	220	$ 14,000	10/58	26	2	28	X
	B100	$ 2,800	8/64	120	20	140	X
	B200 Series	$ 5,500	11/61	448	82	530	X
	B300 Series	$ 9,500	7/65	451	99	550	70
	B500	$ 3,800	11/68	10	0	10	80
	B2500	$ 5,000	2/67	82	18	100	110
	B3500	$ 14,000	5/67	96	24	120	210
	B5500	$ 26,000	3/63	86	8	94	5
	B6500	$ 33,000	6/69	0	0	0	65
	B7500	$ 44,000	9/69	0	0	0	16
	B8500	$200,000	1/69	0	0	0	5
Control Data Corp.	G-15	$ 1,600	7/55	269	11	280	X
	G-20	$ 15,500	4/61	17	2	19	X
	LGP-21	$ 725	12/62	143	3	146	X
	LGP-30	$ 1,300	9/56	100	5	105	X
	RPC-4000	$ 1,875	1/61	47	4	51	X
	160*/160A/160C	$2,100/$5,000/$12,000	5/60;7/61;3/64	461	39	500	X
	924/924A	$ 11,000	8/61	27	1	28	X
	1604/1604A	$ 45,000	1/60	46	3	49	X
	1700	$ 3,800	5/66	140	60	200	92
	3100/3150	$ 10,500	12/64	105	23	128	18
	3200	$ 14,000	5/64	45	15	60	X
	3300	$ 20,500	9/65	113	30	143	20
	3400	$ 19,000	11/64	15	4	19	X
	3500	$ 25,000	1/69	0	0	0	24
	3600	$ 52,000	6/63	31	11	42	X
	3800	$ 53,000	2/66	17	3	20	X
	6400/6500	$ 58,000	5/66	51	18	69	26
	6600	$115,000	8/64	45	13	58	16
	7600	$235,000	1/69	0	0	0	6
Digital Equipment Corp.	PDP-1	$ 3,400	11/60	50	2	52	X
	PDP-4	$ 1,700	8/62	40	5	45	X
	PDP-5	$ 900	9/63	90	10	100	X
	PDP-6	$ 10,000	10/64	18	3	21	X
	PDP-7	$ 1,300	11/64	124	36	160	X
	PDP-8	$ 525	4/65	1129	251	1380	25
	PDP-9	$ 1,100	12/66	233	80	313	30
	PDP-10	$ 11,000	10/67	36	8	44	22
Electronic Associates	640	$ 1,200	9/67	70	30	100	20
	8400	$ 10,000	6/65	19	6	25	1
EMR Computer Division	ASI 210	$ 3,850	4/62	10	0	10	X
	ASI 2100	$ 4,200	12/63	8	0	8	X
	ADVANCE 6020	$ 4,400	4/65	16	0	16	2
	ADVANCE 6040	$ 5,600	7/65	8	3	11	3
	ADVANCE 6050	$ 9,000	2/66	13	4	17	1
	ADVANCE 6070	$ 15,000	10/65	3	2	5	0
	ADVANCE 6130	$ 1,550	10/67	27	6	33	18
General Electric	105	$ 1,350	7/69	0	0	0	150
	115	$ 2,200	12/65	440	635	1075	190
	130	$ 4,500	3/69	0	0	0	145
	205	$ 2,900	6/64	13	0	13	X
	210	$ 16,000	7/59	33	0	33	X
	215	$ 6,000	9/63	20	3	23	X
	225	$ 8,800	4/61	144	20	164	X
	235	$ 12,500	4/64	115	23	138	16
	405	$ 6,200	2/68	52	13	65	40
	415	$ 11,000	5/64	320	101	421	28
	425	$ 19,500	6/64	118	34	152	30
	435	$ 27,000	9/65	34	9	43	14
	625	$ 54,000	4/65	32	5	37	8
	635	$ 62,000	5/65	42	5	47	24
	645	$ 90,000	7/66	75	0	75	2
	GE-PAC 4020	$ 5,000	2/67	80	30	110	60
	GE-PAC 4040	$ 3,000	8/64	45	20	65	5
	GE-PAC 4050	$ 7,000	12/66	22	1	23	X
	GE-PAC 4060	$ 8,500	6/65	18	2	20	2
Hewlett-Packard	200A	$ 2,500	11/68	1	0	1	68

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Honeywell	DDP-24	$ 2,500	5/63	74	2	76	X
	DDP-116	$ 950	4/65	203	43	246	13
	DDP-124	$ 2,150	3/66	56	17	73	16
	DDP-224	$ 3,600	3/65	48	10	58	2
	DDP-516	$ 780	9/66	220	60	280	180
	H-110	$ 2,500	9/68	25	5	30	95
	H-120	$ 4,200	1/66	780	195	975	85
	H-125	$ 5,000	12/67	84	16	100	115
	H-200	$ 9,200	3/64	830	350	1180	90
	H-400	$ 8,500	12/61	53	37	90	X
	H-632	$ 3,500	12/68	1	0	1	32
	H-800	$ 30,000	12/60	59	14	73	X
	H-1200	$ 11,600	2/66	235	60	295	75
	H-1250	$ 12,000	8/68	20	5	25	65
	H-1400	$ 14,000	1/64	8	2	10	X
	H-1800	$ 50,000	1/64	16	4	20	X
	H-2200	$ 16,500	1/66	124	28	152	72
	H-4200	$ 20,500	9/68	4	0	4	22
	H-8200	$ 50,000	12/68	0	0	0	8
IBM	305	$ 3,600	12/57	61	24	85	X
	360/20	$ 2,800	12/65	5680	3920	9600	2100
	360/25	$ 5,330	10/68	60	5	65	2700
	360/30	$ 8,800	5/65	5415	3760	9175	850
	360/40	$ 16,800	4/65	2550	1050	3600	600
	360/44	$ 15,000	7/66	260	55	315	70
	360/50	$ 32,000	8/65	1030	230	1260	700
	360/65	$ 60,000	11/65	495	95	590	280
	360/67	$138,000	6/66	41	9	50	33
	360/75	$ 81,400	1/66	34	8	42	12
	360/85	$115,000	10/69	0	0	0	23
	360/90 Series	$150,000	11/67	8	0	8	11
	650	$ 4,800	11/54	83	27	110	X
	1130	$ 1,700	2/66	3200	1300	4500	2800
	1401	$ 6,200	9/60	3000	1950	4950	X
	1401-G	$ 2,300	5/64	630	620	1250	X
	1401-H	$ 1,300	6/67	250	180	430	X
	1410	$ 17,000	11/61	329	191	520	X
	1440	$ 4,100	4/63	1680	1245	2925	X
	1460	$ 9,800	10/63	622	118	740	X
	1620 I, II	$ 4,000	9/60	875	475	1350	X
	1800	$ 5,000	1/66	445	160	605	200
	7010	$ 26,000	10/63	133	22	155	X
	702	$ 6,900	2/55	3	0	3	X
	7030	$160,000	5/61	5	1	6	X
	704	$ 32,000	12/55	18	2	20	X
	7040	$ 25,000	6/63	56	44	100	X
	7044	$ 36,500	6/63	89	32	121	X
	705	$ 38,000	11/55	29	5	34	X
	7070, 2, 4	$ 27,000	3/60	156	84	240	X
	7080	$ 60,000	8/61	78	3	81	X
	709	$ 40,000	8/58	3	0	3	X
	7090	$ 63,500	11/59	30	6	36	X
	7094	$ 75,500	9/62	93	3	96	X
	7094 II	$ 82,500	4/64	108	9	117	X
National Cash Register	NCR-304	$ 14,000	1/60	20	2	22	X
	NCR-310	$ 2,500	5/61	10	0	10	X
	NCR-315	$ 9,000	5/62	535	277	812	25
	NCR-315-RMC	$ 12,500	9/65	93	23	116	15
	NCR-390	$ 1,950	5/61	1025	475	1500	X
	NCR-500	$ 1,650	10/65	1700	780	2480	300
	Century-100	$ 2,645	9/68	65	0	65	840
	Century-200	$ 7,500	4/69	0	0	0	500
Philco	1000	$ 7,010	6/63	14	1	15	X
	2000-210, 211	$ 40,000	10/58	13	1	14	X
	2000-212	$ 52,000	1/63	12	1	13	X
RCA	RCA 301	$ 7,500	2/61	399	206	605	X
	RCA 3301	$ 19,000	7/64	75	10	85	X
	RCA 501	$ 14,000	6/59	76	2	78	X
	RCA 601	$ 35,000	11/62	4	0	4	X
	Spectra 70/15	$ 4,500	9/65	149	66	215	60
	Spectra 70/25	$ 7,200	9/65	92	35	127	40
	Spectra 70/35	$ 8,400	1/67	146	62	208	135
	Spectra 70/45	$ 24,000	11/65	210	65	275	65
	Spectra 70/46	$ 33,400	11/68	1	0	1	5
	Spectra 70/55	$ 35,000	11/66	14	2	16	15
Raytheon	250	$ 1,200	12/60	122	48	170	X
	440	$ 3,500	3/64	18	2	20	X
	520	$ 3,200	10/65	23	3	26	X
Scientific Control Corp.	650	$ 500	5/66	23	0	23	0
	655	$ 1,800	10/66	66	0	66	10
	660	$ 2,000	10/65	11	0	11	2
	670	$ 2,600	5/66	1	0	1	0
	4700	$ 800	2/69	0	0	0	24
	6700	$ 16,000	11/69	0	0	0	1
Scientific Data Systems	SDS-92	$ 1,500	4/65	128	7	135	X
	SDS-910	$ 2,000	8/62	205	15	220	X
	SDS-920	$ 2,900	9/62	181	8	189	X
	SDS-925	$ 3,000	12/64	58	2	60	X
	SDS-930	$ 3,400	6/64	220	25	245	X
	SDS-940	$ 18,000	4/66	36	2	38	16
	SDS-9300	$ 8,500	11/64	32	2	34	X
	Sigma 2	$ 1,800	12/66	138	22	160	155
	Sigma 5	$ 7,000	8/67	53	17	70	65
	Sigma 7	$ 13,500	12/66	41	12	53	22
Standard Computer Corp.	IC6000	$ 18,000	5/67	13	0	13	12
	IC4000	$ 10,000	9/68	2	0	2	6
Systems Eng Labs	810	$ 1,000	9/65	22	2	24	X
	810 A/B	$900/$1,100	8/66;9/68	143	11	154	52
	840	$ 1,400	11/65	4	0	4	X
	840 A/MP	$1,400/$1,600	8/66;10/67	56	2	58	26
UNIVAC	I & II	$ 25,000	3/51 & 11/57	17	0	17	X
	III	$ 21,000	8/62	74	13	87	X
	File Computers	$ 15,000	8/56	9	0	9	X
	SS 80, 90 & Step	$ 8,000	8/58	103	72	175	X
	418	$ 11,700	6/63	104	53	157	15
	490 Series	$ 32,000	12/61	182	26	208	30
	1004	$ 1,900	2/63	1730	1010	2740	X
	1005	$ 2,550	4/66	920	420	1340	60
	1050	$ 8,800	9/63	185	85	270	X
	1101-1105	$ 35,000	12/50	6	0	6	X
	1107	$ 57,000	10/62	19	8	27	X
	1108	$ 68,000	9/65	121	43	164	100
	9200	$ 1,600	6/67	290	90	380	580
	9300	$ 3,600	9/67	150	50	200	465
	9400	$ 7,000	5/69	0	0	0	115
	LARC	$135,000	5/60	2	0	2	X
			TOTALS	47,061	22,387	69,448	16,672

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February 10, - February 28, 1969

NEW YORK STOCK EXCHANGE	1968-1969 High	1968-1969 Low	3 week Sales in 100's	3 week High	3 week Low	Last	3 week Net Change	3 week % Change
Addressograph-Multigraph	91 7/8	52	2178	75 7/8	68 5/8	68 3/4	- 1 1/4	- 1.72
American R & D	207	122 1/2	342	176	156	158	-14 1/4	- 8.27
Ampex Corp.	42 3/8	26 1/2	1694	38	32 1/2	33 3/8	- 3 1/2	- 9.24
Bunker Ramo	21 3/8	13 1/2	5911	16	13 1/2	13 7/8	- 2	- 8.74
Burroughs	255 3/4	157	1267	245 5/8	220 5/8	223 1/4	-15 1/2	- 6.49
Collins Radio	101 1/8	52	1577	62 1/2	52	54 1/8	- 7	-11.45
Computer Sciences	67 3/8	31 5/8	1953	61	49	52 1/4	- 8 3/4	-14.34
Control Data	163 1/2	124 1/4	8418	144 1/4	125 1/8	127 1/4	-13 1/4	- 9.45
Electronic Assoc.	27 3/8	18	1019	24	19 3/8	19 5/8	- 3 3/4	-16.04
General Electric	100 3/8	80 1/4	3874	92 7/8	85 1/8	86 1/2	- 5 3/8	- 5.85
Honeywell	139 3/4	89 3/8	1320	122 3/4	113 5/8	115 3/4	- 3 1/2	- 2.94
IBM	375	293 1/4	3454	310 1/2	293 1/4	293 3/8	- 4 5/8	- 1.55
ITT	62 1/2	44 7/8	4597	55	51	51 1/2	- 2 1/2	- 4.63
Litton	104 3/4	55	5391	62 5/8	55	56 1/8	- 3 7/8	- 6.46
Memorex	93 1/2	61 1/2	2300	74 3/4	68 1/4	70 3/8	+ 2 7/8	+ 4.26
Nat. Cash Register	154	99 1/2	1274	121 3/4	108 1/8	108 7/8	- 9 1/8	- 7.73
RCA	55	42	5087	44 3/8	42	43 3/4	- 5/8	- 1.41
Raytheon	54	33 1/4	1497	45	39 1/2	39 7/8	- 4 3/4	-10.89
Sanders	66 1/2	40 3/4	2089	61 7/8	40 3/4	42	-17 3/4	-29.71
Scientific Data	119 3/4	79 3/4	6518	119 3/4	101 1/2	108 3/4	+ 8 1/4	+ 8.21
SCM	61 1/4	35 3/4	1763	44 7/8	39 7/8	40	- 4 3/4	-10.61
Singer	88 7/8	62 3/4	1548	84 1/4	82 1/2	75 5/8	- 7	- 8.47
Sperry Rand	63 3/8	41 3/8	4196	52 5/8	46 5/8	47 3/4	- 4 1/4	- 8.17
Teledyne	143 7/8	84	3161	100 3/4	84	84 1/8	-18 3/8	-17.93
NYSE COMPUTER STOCK AVERAGE							- 5.70	- 7.90
AMERICAN STOCK EXCHANGE								
Automatic D P	77 1/4	42	418	77 1/8	68	68	- 4 1/4	- 5.88
Calcomp	53 1/4	26 3/4	783	37 1/2	33 5/8	33 7/8	- 1 1/4	- 3.56
Clary Corp.	32 3/8	12 1/4	445	23 3/4	20 5/8	21 5/8	- 1 7/8	- 7.98
Computer Applications	42 5/8	16 1/4	428	19 7/8	16 1/2	16 1/2	- 2	-10.81
Computing and Software	93 1/4	43 1/2	221	89	74 1/2	74 1/2	-15 1/2	-17.22
Data Proc. Fin. & Gen.	72 1/2	46	3299	57 3/8	46	46 3/8	- 5 1/8	- 9.95
Data Products	28 7/8	17 1/8	2037	23 7/8	18 3/8	18 3/4	- 4 1/2	-19.15
Digital Equipment	179	95 1/4	327	165	138 1/2	143 1/2	-20	-12.32
Elect. Comp. Prog. In.	51 3/4	25 5/8	1064	38 1/4	31 1/8	31 1/8	- 2 1/4	- 6.74
Granite Computer	58 7/8	32 1/4	593	40 1/4	32 1/4	32 5/8	- 7	-17.67
Greyhound Computer	43 1/2	22	466	26 7/8	22	22	- 4	-15.38
Leasco	143	70 3/4	4594	134 1/2	98 1/4	99	-34	-25.56
Levin-Townsend Comp.	67 3/4	42	1924	51 3/4	42	42	- 9 3/8	-18.24
Milgo Elect.	52 3/4	14 3/8	676	33 1/8	25 5/8	26 1/4	- 7 1/8	- 2.13
Mohawk Data Sciences	107 1/2	58	2063	68	60 1/4	61 1/2	- 4 1/2	- 6.82
Planning Research	29 3/4	25 3/4	963	29 1/4	26 3/8	26 3/4	- 1 5/8	- 5.72
Potter Instrument	38 1/2	20 1/2	676	35	31 1/2	31 3/4	- 2 1/2	- 7.30
Randolph Computers	64	34 5/8	1566	43 3/4	35 1/8	35 1/4	- 5	-12.42
Systems Eng. Labs.	42 5/8	26 1/8	1254	31	26 1/8	27 1/8	- 1 5/8	- 5.65
AMSE COMPUTER STOCK AVERAGE							- 6.91	-11.08

OVER-THE-COUNTER	1968-1969 High Bid	1968-1969 Low Bid	February 28, Bid	February 28, Asked	3 weeks ago Bid	3 week net change Bid	3 week % change Bid
Applied Data Research, Inc.	36 1/2	14 1/2	35	37	35	--	--
Aries Corp.	24	12 1/2	13	14 1/2	16	- 3	-18.75
Bolt, Beranek & Newman, Inc.	27 1/2	14	15 1/2	16	17 3/4	- 2 1/4	-12.68
Computer Usage	62	23 1/2	33 1/2	35 1/2	36	- 2 1/2	- 6.94
Cyber-tronics	19	9 1/2	9 1/2	10	11	- 1 1/2	-13.64
Digitronics	27 1/2	16 1/2	18	19	19 1/2	- 1 1/2	- 7.69
DPA, Inc.	20 3/8	11	11	11 3/8	13 1/4	- 2 1/4	-16.98
Electronic Memories	67	32 3/4	48	49	54 3/4	- 6 3/4	-12.33
Fabri-Tek	20 3/4	8 7/8	10 3/4	11 1/4	11 5/8	- 7/8	- 7.52
Informatics, Inc.	34	16	21		24 3/4	- 3 3/4	-15.15
LMC Data, Inc.	16	5 3/4	5 3/4	6 1/2	7 1/4	- 1 1/2	-20.69
Management Assistance	16 3/4	9 1/4	9 7/8	10 1/4	12 7/8	- 3	-23.30
Optical Scanning Corp.	145	71	91	93	108	-17	-15.74
Recognition Equipment, Inc.	101	38 1/2	56	58	69	-13	-18.84
Tally Corp.	51 1/2	27	27	29	33	- 6	-18.18
TBS Computer Centers Corp.	21 3/4	10 1/2	11	12 1/2	14 1/4	- 3 1/4	-22.81
University Computing	185	57	109	112	130	-21	-16.15

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REVIEW AND FORECAST ISSUE

E|D|P industry report
AND MARKET REVIEW / FORMERLY E|D|P INDUSTRY AND MARKET REPORT
• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JANUARY 26,1968 • VOL.3,NO.14 P.J.McGOVERN, EDITOR

What a year!

COMPUTER SHIPMENTS ZOOM TO ALMOST $6 BILLION

Everyone knew it was going to be a good year for the computer industry, but until the figures were added up and the experts compared notes, no one really realized how good 1967 actually turned out to be. 1967 was fantastic. Here are some of the highlights of last year in the computer industry:

- Shipments of new computer equipment, by American manufacturers, skyrocketed to $5.9 billion, an impressive 61.2% increase over the $3.66 billion shipped in 1966.

- The total computer industry -- including special-purpose computers, supplies, supporting services, software, service bureaus, and consultants as well as general-purpose digital systems -- reached the $9.3 billion level.

- The number of installed computers, manufactured by U.S.-based companies, reached 57,600. These systems have a net original value of $18.9 billion, and are located at 27,000 customer sites around the world.

- The role of third-party leasing became a major factor in the computer industry . . . significant enough to warrant defensive action at yearend by IBM, the dominant company in the industry, because earnings were accelerated substantially above the company's own forecasted goals.

- Software packages became an accepted product in the computer industry, and sales or leases of these packages -- produced by independent software firms for the most part -- should grow as the concept gains more and more customer acceptance.

- Most manufacturers -- especially those with a large base of revenue-producing equipment in the field -- began to find that a substantial portion of their new equipment production was going to "add-on" -- to the upgrading of currently installed computer systems. This trend should continue to develop as users gain more experience in applying computers to their business problems.

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Shipments, by manufacturer, in 1967

Every major company in the computer industry increased its business last year, some more than others. RCA led the list, according to estimates by the International Data Corporation, publisher of EDP/IR, with an 84% increase in shipments. It was followed closely by UNIVAC, up 74%, and IBM, which increased its shipments by 72%. These growth rates are all ahead of the industry level of 61.2%. The table, below, contains IDC's estimate of computer shipments by principal American computer manufacturers during 1967. The figures reflect worldwide shipments of new computers and new equipment added to computers; they do not include equipment refurbished by the manufacturer and shipped to new customers.

Company	Shipments in $ millions	Percentage
International Business Machines	$4300	72.9%
UNIVAC	340	5.8
Honeywell	320	5.4
General Electric	240	4.1
Control Data Corporation	200	3.4
Radio Corporation of America	175	3.0
National Cash Register	140	2.4
Burroughs	105	1.8
Scientific Data Systems	53	0.7
Digital Equipment Corporation	26	0.4
Others	11	0.1
TOTAL	$5910	100.0%

Outlook for 1968, by manufacturer

Each of the ten companies listed above had particular reasons for its relative success, and each has strengths and problems in the year just started. Here is our prognosis for each of the leading manufacturers of electronic data processing equipment:

Burroughs. Orders during 1967 reached an all-time high. This accomplishment was helped significantly by the $60 million Phase II contract with the Air Force and by a series of orders from British banks worth even more. The company has put together an enthusiastic marketing staff and has backed it with an effective software development team and with hardware that works. The size of the Air Force order is likely to grow significantly -- and even at the present level it is likely to account for a significant share of small commercial computer production for the next two years -- so production could be a problem as orders increase. Burroughs, however, says it has planned enough expansion to take care of this.

The first B8500 has been delivered, and initial "rumors" indicate there are massive problems. Quite a few potential customers are taking a close look at the B8500, so the performance of the first machine, as it goes into operation, is crucial to Burroughs' success in the large computer marketplace.

Look forward, before long, to an across-the-board introduction of the TC-500, a terminal computer based on equipment designed for the British banking orders. These units at present are scheduled for manufacture in Britain, so they could be quite attractive in the international market, following devaluation of the Pound. The big hindrance to their introduction in the U.S. is probably concern about their impact on electronic accounting equipment marketed by other divisions.

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Control Data. There's little question, now, that CDC is the world leader in the large-scale machine market. More than 60 of the 6000 series machines are installed and another 40 are on order. Later this year, the super-scale 7600 computer is scheduled for delivery.

The company, during 1967, continued to emphasize its role as supplier of computer peripheral equipment and terminals, and its OEM business has expanded considerably with the increased popularity of disk pack storage. Also, CDC has a good position in the disk pack market, supplying packs for its own as well as for IBM drives. We expect CDC's manufacture of peripheral equipment, primarily for the OEM market, to receive increased emphasis because the company has difficult problems in keeping profit levels up as its computer shipments shift from direct sales to rental contracts that defer income over many years.

As long as its stock is selling at sufficiently high levels, Control Data is expected to continue its acquisition activity to create a larger base that is not completely dependent on computers for revenue. CDC is the only major manufacturer so heavily dependent on computers for revenue. The acquisition of C-E-I-R gives CDC a strong position in the service and education field, and also a potential market for quite a few computers. The recent acquisition of the data processing systems division of SCM Corp. is another step to broaden the base from which the company operates.

Digital Equipment Corp. The mini-computer market is booming, and DEC is the giant. Competition from such companies as Varian, Hewlett-Packard, and Interdata is increasing, but the demand for small computers is insatiable, it seems. The $5,000 to $20,000 units are being incorporated into many instrumentation systems, and are serving as communication controllers. At present, market demands for small digital computers seem to be considerably larger than the capacity of all the companies manufacturing these devices, and therefore the prospects for DEC, with its proven capabilities, seem nothing but bright.

General Electric. Things seem to have settled down around GE after its varions management shifts during 1967, but the company has a lot to do. For one thing, GE lost a sizeable portion of its computer sales force as a result of the management shake-ups. It appears to us that 1968 is the crucial year in which GE should lay the groundwork for a turn-around in the 1969-to-1972 period. With most of its earlier costs probably written off, the computer operation of GE should be able to do this.

The company seems to have a three-pronged potential for growth: 1) The 115, a small system designed and manufactured by Olivetti, has caught on well and will likely receive major emphasis during the coming year. 2) The company is expected to upgrade its 200 series users to 400 series machines. 3) GE is probably the company with the most experience in communications-oriented computer systems, and can be expected to push this concept with the 420 and the expected 430 and 440 combinations of existing equipment. Also, the bugs seem to have been worked out of the 600 series (with the possible exception of the specially designed 645), and this line should receive increased emphasis. A small version, the 615, has been installed at selected customer sites during 1967, and this machine may enter the regular product line by mid-year. In addition, GE continues its emphasis on remote computing services, and currently has direct dial-up facilities in about 40 cities; in fact, the division of GE which provides these time-sharing services is the largest single user of GE computers.

Honeywell. With almost 3000 computers installed, and with about 80% of them on long-term rental contracts, Honeywell has developed a firm base that should allow it to show very handsome profits from its EDP operations during the next

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three years. Also, with the large demand for small computers, Honeywell's Computer Control Division is in good shape to share in an active and profitable market.

Honeywell's marketing efforts will shift even more from that of replacing second generation IBM equipment to that of installing small computers with companies who are acquiring their first computer. A strong effort should be expected in this downward expansion of the marketplace, and additions to the 200 series product line should be expected. Honeywell will introduce a small computer with software packages designed to assist companies who are acquiring their first computer.

Also, the company should begin making more use of its widespread sales force. Its recent announcement of a disk pack production capacity is the first step in this direction. We anticipate the announcement of a keyboard-to-tape peripheral that will give Honeywell an entry in the vast data preparation market. All of these moves are designed to build up activities which will provide a base for sustaining revenue from small computer installations.

IBM. The industry giant faces -- in spades -- all of the problems that may face other computer manufacturers as they enter the middle years of the marketing life of the current computer generation. In introducing the 360/25, IBM demonstrated an ability to upgrade, and therefore increase the market life of, its current product line. If the idea of dynamic storage of emulators can be worked into the whole product line, IBM may well postpone the need for announcing a new product line. Indeed, this product well illustrates the evolution that EDP/IR thinks will be characteristic of new computer equipment during the next several years, if not longer.

We do expect several more new system announcements designed to hone the rough edges off the still-imperfect circle. One is the long-awaited small-scale computer. The speculated Model 10 (which insiders say may be called the Model 7) will rent for $500 to $2000 a month, and will be a good communications terminal as well as a stand-alone computer. And there is still a chance that IBM will go ahead and introduce the Model 85. If so, it will probably be designed primarily to convert the current large 7000 series users, who have too much invested in programming to switch to System/360.

IBM also may decide to concentrate on improving its posture in the data preparation area. This might well include adaptation of its magnetic tape Selectric typewriter to a key-punch replacement by offering a buffer unit which converts its quarter-inch tape (now used primarily for text preparation) into computer-compatible half-inch tape. This method of entering the direct keyboard-to-tape field would be economical at first only for large key-punch users, and would give IBM some control in replacing its hundreds of thousands of keypunches now installed, depreciated, and producing revenue. Also, this approach conceivably could allow IBM to buffer the quarter-inch tapes directly onto disk packs.

It is needless to say that IBM continues to have the largest system support and marketing task force in the business. And, with about 80% of the value of its equipment on rental, IBM has a very stable platform from which to continue increased revenues and earnings. The impact of leasing companies on IBM's planned profit (because leasing companies buy computers outright) seems to be a thorn in IBM's side, and the company possibly will take even more moves to counteract the surge in leasing company activity. One method would be to announce a plan for three- or five-year rental contracts at slightly reduced rates, just as companies such as Burroughs and Honeywell offer.

NCR. As we predicted last year, NCR continues to take advantage of its current product line, beefing up its catalog with peripherals purchased from outside

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companies such as Control Data, Mohawk Data, Sanders, and the like. The 615's introduction has been delayed because the 315 -- with marketing concentrated on retailing and banking areas -- has continued to draw impressive orders and NCR wants to make sure its new machine is ready. The new 615 could be the most thoroughly prepared-for announcement of the 1960s. This series, which will be heavily disk oriented, could be announced momentarily and is definitely expected by mid-March (although it could be postponed again) . . . perhaps with a different designation, since its current name is tossed about as if it were already here.

RCA. According to plan, RCA is steadily building the base for a profitable computer business in the 1970s. Indeed, as it prepares to be a major supplier in the decade of the 1970s, the company is making commitments to new manufacturing facilities. At present, the Spectra series continues to be successful, both as a second source of supply to some large IBM users and in selected markets of its own. Deliveries almost doubled last year. Still, the company has limited marketing objectives for its current series of computers . . . a selected sales effort concentrated on potential customers where there is a reasonable chance for a sale.

SDS. The 940, for limited-size time-sharing applications, is finally working well and its software is debugged. The company continues to receive substantial orders, and has set up its own time-sharing center as well. The company continues to be a pace-setter in certain fields, and led the way in selling software separate from hardware. Its production of the Sigma series is finally coming along according to plans, and we expect a small member of this family -- the Sigma 1 -- to be announced during the year. SDS's main areas of success, however, continue to lie in the field of communications-oriented computer systems, and there is little likelihood that the company will have any great impact on the general-purpose computer market.

UNIVAC. Whether by design or by chance, UNIVAC has two large machines that "hit." During 1967 it had a higher-than-expected order and delivery level of the 1108 and the 490 series, and the near-term outlook for these communications oriented systems looks good. Indeed, they make UNIVAC the leader in business application of time sharing. Keydata started with the 490 series, and already has upgraded to the 494. And University Computing, which is busy installing time-sharing centers around the country, is dedicated to the 1108.

The new 9400, a disk-oriented computer, has strengthened the company's marketplace for the smaller members of the 9000 series, but in this field the company continues its limited marketing objectives -- primarily to multiple-system customers such as the Federal Government -- since single sales to small users are really not profitable for UNIVAC, and salesmen's compensation plans don't encourage them.

But things seem finally to have changed at UNIVAC. During the year it has made significant reorganizations in its marketing department, and, more important, the Sperry division is starting to make money. Because of this, morale is up and the group's leaders can make more intelligent business decisions in planning for long-range growth.

INDUSTRY EXPECTATIONS FOR 1968

The huge increase in computer shipments last year, following as it does on the heels of a 52.5% increase in 1966, reflects the second of the two, key step-up years in the seven-year cycle of a computer generation. During the next few years, we expect a plateauing in the level of computer shipments, especially in shipments within the U.S. Shipments outside the U.S. should continue to increase for at least two years, and therefore we estimate industry shipments to be between

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$6.3 billion and $6.5 billion for 1968, and to exceed $7 billion in 1969. During this period, manufacturers will continue to smooth out their present product lines and introduce less expensive equipment that will give them a downward expansion of the marketplace.

As the mid-year in the life of current generation computers, 1968 should see most manufacturers with a sufficient rental machine base so that their profit column -- previously red or near-red -- will move healthily into the black. Overall, we call 1968 the year of synergism, because independent activities in various portions of the computer industry may well have more effect on the total industry than could be expected from each, taken independently.

• Advances in technology are bringing prices down, and with the large, untapped reservoir of punched-card and manual system users, computer manufacturers will be bringing out even smaller machines -- and supporting software -- to add even more customers to their revenue-producing base. Most of the major manufacturers, as discussed in the previous section, have plans in this area.

• The high rate of computer installation during the last two years has led to personnel shortages, particularly in the area of systems analysis, programming, and sales. This will act to hamper the growth of advanced computer applications, unless the vacuum can be filled by independent software firms, particularly those with specialized packages for sale. Also, these shortages provide a growing market for training and for special courses from computer consultants. And there is a good appeal for basic-level training programs such as offered in Control Data Institutes, so we can expect other manufacturers to offer similar services. On a more sophisticated level, we find the IBM Systems Institute being opened to non-employees on a tuition basis. Thus, IBM is moving firmly into the education business, as contrasted to education services. Finally, the strong Federal emphasis on job training would suggest that substantial subsidies will be given to organizations that offer computer-related training services.

• This will be a crucial year for third-party leasing companies. For the first time, a substantial number of initial leases will be expiring, and the companies will find now that they will have to develop some expertise in computer sales and support, rather than in financial management as has been the situation. Leasing companies without the backup of people knowledgeable in computers may find the sledding not so smooth. Also, IBM can be expected to exert some degree of "control" over the growth of leasing companies, since it must have a large rental base to assure its earnings in the future.

• There will be considerable fractionation in the computer services industry. Small service organizations have had enthusiastic welcomes from the financial community, and as long as this continues it should encourage small groups of people to break away from current service organizations and to establish independent enterprises . . . with the prospect of a quick and easy fortune. The overall effect of this could be to considerably heighten competition within the services field and to cause a disruption of service to clients of firms from which the new groups choose to depart.

• The computer terminal market should expand considerably this year. A bevy of new computer terminals were announced at the Fall Joint Computer Conference, and increasing activity in this direction should continue . . . although any rulings by the Federal Communications Commission, following the hearings next month on the interrelationships between computers and communications, may determine what type of terminals the communication companies can offer in competition.

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A HISTORY, PROJECTION, AND ANALYSIS OF THE COMPUTER INDUSTRY THROUGH 1975

We have recently updated our continuing computer industry study that measures the current and expected annual sizes of the five principal sectors of the industry. These five principal sectors are 1) General-purpose digital computers, 2) Special-purpose system computers (analog and digital), 3) Independent peripheral equipment, 4) Programming specialists, service bureaus, and consulting services, and 5) Data processing supplies and supporting services. Manufacturers in the prime sector have been discussed previously in this report. Below is a discussion of the other four sectors and the types of companies participating in each:

Special-purpose system computers (digital and analog) includes leading manufacturers of analog and digital computers generally used in special-purpose systems. Analog computers are included in this category because their use is usually concentrated in specific problem areas, e.g., simulation of dynamic systems.

Peripheral equipment includes leading manufacturers of peripheral equipment used with computers. Examples are paper tape handling equipment, magnetic tape transports, mass storage units, high-speed printers, graphic displays, data transmission units, on-line terminals, and the like. Core memories are also included in this category.

Programming specialists, service bureaus, and consulting services includes firms supplying programming services or software to computer manufacturers and users, firms offering software packages for sale, and firms supplying computer services on a contract or service bureau basis. This sector also includes firms offering consulting services in the selection, implementation, and/or use of computers and data processing equipment. Firms that offer time-sharing services are included in this category.

Data processing supplies and supporting services includes firms selling expendable data processing supplies such as paper tape, punched cards, magnetic tape, business forms, disk packs, etc. Also, this sector includes related supported activities conducted by personnel services, magazine and textbook publishers, leasing firms, etc.

DISCUSSION OF COMPUTER INDUSTRY TRENDS THROUGH 1975

The results of our updated study are shown in Tables I-IV. Table I contains our estimates of the annual market sizes of the five principal sectors of the computer industry between 1955 and 1967, and our projections of the annual market size of each during the period from 1968 through 1975. In Table II, we show the estimated and expected number of computer systems shipped each year by American-based computer manufacturers. The value of these shipments is repeated for convenience. For each year in the study we have presented our estimate of the net cumulative number and value of American-made systems installed throughout the world. Also, to emphasize the changing character of the computer marketplace, we have indicated the number of customer sites at which these computers are used. In Tables III and IV we have broken down the information from Table II into its domestic and foreign segments. The differences in the two illustrate the changing character of the two markets. *Also, starting with this issue, the Monthly Computer Census will be broken down into its domestic and foreign components. This breakdown recognizes the increasing importance of foreign shipments to U.S.-based computer manufacturers, and hopefully will be of assistance to our readers.*

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TABLE I ESTIMATED AND PROJECTED ANNUAL VALUE OF COMPUTER EQUIPMENT SHIPPED BY AMERICAN MANUFACTURERS AND THE ANNUAL SIZE OF THE RELATED PERIPHERAL EQUIPMENT, SOFTWARE, AND SERVICES MARKET

(Values in $Millions; Equipment values calculated as purchase price of systems when shipped)

Year	General Purpose Digital Computers	Special Purpose System Computers	Independent* Peripheral Equipment	Software, Service Bureaus, Consultants	Supplies and Supporting Services	Total
1955	$ 75	$ 80	$ 14	$ 15	$ 155	$ 339
1956	140	210	25	20	175	570
1957	240	350	35	25	195	845
1958	460	450	50	40	230	1230
1959	600	650	75	90	270	1685
1960	720	900	105	125	375	2225
1961	1100	1100	110	180	500	2990
1962	1400	1300	130	220	550	3600
1963	1800	1300	145	270	630	4145
1964	2200	1200	170	320	680	4570
1965	2400	1250	175	425	730	4880
1966	3660	1400	185	510	840	6595
1967	5900	1610	225	610	980	9325
1968	6300-6500	1750-1850	275-290	700-720	1090-1130	10,115-10,490
1969	7000-7300	1900-2000	340-370	820-850	1200-1280	11,260-11,800
1970	7800-8400	1900-2100	430-480	980-1040	1300-1400	12,410-13,420
1975	$17,000-18,000+		1300-1500	1300-1600	1600-2000	21,200-23,100

* Part of this equipment is sold to computer manufacturers.

\+ Distinction between general - and special-purpose equipment expected to disappear by 1975

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TABLE II WORLDWIDE ANALYSIS OF GENERAL-PURPOSE DIGITAL COMPUTERS MADE BY U.S. FIRMS
(Values, in $Millions, calculated as purchase price of systems when shipped)

Year	No. of Systems Shipped	Cumulative Net Systems Installed (Yearend)	Value of Computer Equipment Shipped	Cumulative Net Value Installed (Yearend)	Cumulative Customer Installation Sites (Yearend)
1955	150	250	$ 65	$ 180	190
1956	600	800	170	340	575
1957	1000	1700	280	600	1100
1958	1400	2950	460	1035	1900
1959	1700	4500	$ 600	$ 1600	2900
1960	2200	6500	720	2265	4000
1961	3400	9300	1100	3265	5400
1962	4500	12,600	1400	4515	7400
1963	5600	16,800	$ 1710	$ 5975	9600
1964	7500	24,000	2200	7925	14,000
1965	7400	31,000	2400	10,100	17,000
1966	10,200	40,600	3660	13,500	22,000
1967	18,700	57,600	$ 5900	$ 18,900	27,000
1968	19,500-20,500	73,000- 75,000	$6300-6500	$23,500-24,500	34,000-36,000
1969	21,500-23,000	90,000- 94,000	7000-7300	28,500-30,500	40,000-43,000
1970	24,000-26,000	108,000-112,000	7800-8400	33,500-37,500	48,000-52,000
1975	48,000-54,000	200,000-220,000	$17,000-18,000	$85,000-90,000	70,000-80,000

General trends developing in the computer industry

In preparing the data in the accompaning tables, we have identified several trends that seem to be developing in the rapidly growing computer industry. We discuss below some of the developments that seem most pertinent to the medium-term future of the computer industry:

- Although there will be year-to-year variations, the growth in yearly shipments of new computing equipment should be 15% (compounded) or above over the next seven to ten years. In previous estimates, we have shown this rate to be dropping off as the industry matured. And we do expect a slow-down in this rate for the next few years. But for the forseeable future, we expect the computer industry to remain a true growth industry.

- Already we are starting to see the development of hardware-in-software, with the IBM 360/25. This trend will probably continue as new models

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TABLE III GENERAL-PURPOSE DIGITAL COMPUTERS, MADE BY U.S. FIRMS, INSTALLED WITHIN THE U.S.*
(Values, in $ Millions, calculated as purchase price of systems when shipped)

Year	No. of Systems Shipped	Cumulative Net Systems Installed (Yearend)	Value of Computer Equipment Shipped	Cumulative Net Value Installed (Yearend)	Cumulative Customer Installation Sites (Yearend)
1955	145	244	$ 63	$ 177	185
1956	550	746	156	324	533
1957	850	1500	240	547	930
1958	1180	2550	395	923	1575
1959	1395	3810	$ 495	$ 1390	2380
1960	1790	5400	590	1937	3210
1961	2700	7550	880	2715	4195
1962	3470	9900	1090	3620	5590
1963	4200	12,850	$ 1300	$ 4720	7050
1964	5600	18,200	1670	6105	9875
1965	5350	23,200	1770	7655	12,275
1966	7250	29,800	2640	10,030	15,650
1967	11,200	40,100	$ 3900	$ 13,600	18,400
1968	11,300-12,100	49,000-50,000	$ 4100-4200	$16,600-17,400	22,000-23,500
1969	12,100-13,100	57,000-59,000	4350-4500	19,500-21,100	24,000-26,000
1970	13,250-14,250	68,000-69,000	4700-5100	22,000-25,000	27,000-29,500
1975	23,000-27,000	100,000-110,000	$ 8,000-8,200	$47,000-48,000	33,000-39,000

*Only a few computers installed in the U.S. were made by foreign firms.

are introduced into current equipment lines. Indeed, we may well see an evolution -- as hardware and software techniques are developed -- rather than a revolution, or direct change, into a new generation of computers. As a result, a new generation may be here before we know it.

- There is already a good growth rate in the peripheral equipment market, and this will undoubtedly increase during the next few years . . . particularly in the sales of computer terminals. The one possible hindrance to this growth would be heavy legislative activity, based on FCC recommendations, and therefore intense competition from the communications companies themselves. This, even, will not slow the growth of this type equipment; but it could move it away from computer companies.

- As Table I indicates, our projections for the computer services and consulting areas are becoming more optimistic for the next several years. The growing shortage of personnel will definitely expand the need for training services and for package programs during this period. As has

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TABLE IV GENERAL-PURPOSE DIGITAL COMPUTERS, MADE BY U.S. FIRMS, INSTALLED OUTSIDE THE U.S.
(Values, in $ Millions, calculated as purchase price of systems when shipped)

Year	No. of Systems Shipped	Cumulative* Net Systems Installed (Yearend)	Value of Computer Equipment Shipped	Cumulative* Net Value Installed (Yearend)	Cumulative Customer Installation Sites (Yearend)
1955	5	6	$ 2	$ 3	5
1956	50	54	14	16	42
1957	150	200	40	53	170
1958	220	400	65	112	325
1959	305	690	$ 105	$ 210	520
1960	410	1100	130	328	790
1961	700	1750	220	550	1205
1962	1030	2700	310	895	1810
1963	1400	3950	$ 410	$ 1255	2550
1964	1900	5800	530	1820	3625
1965	2050	7800	630	2445	4725
1966	2950	10,800	1020	3470	6350
1967	7500	17,500	$ 2,000	$ $ 5300	8600
1968	8200- 8400	24,000-25,000	$2200-2300	$ 6900- 7100	12,000-12,500
1969	9400- 9900	33,000-35,000	2650-2800	9000- 9400	16,000-17,000
1970	10,750-11,750	40,000-43,000	3100-3300	11,500-12,500	21,000-22,500
1975	25,000-27,000	100,000-110,000	$9000-9800	$38,000-42,000	37,000-41,000

*Takes into account expected shipments of some used computers from U.S. Installations to foreign customers during the late 1960's and the early 1970's.

been pointed out in the past, however, the development of hardware-in-software computers will limit the opportunities for custom programming applications which have provided a good share of the revenue to firms in this portion of the market.

- As the projections show, the international portion of the market is expected to increase more rapidly than the domestic for the next several years. These could be hampered -- especially for peripheral manufacturers and other companies trying to get started at present -- because of the recently announced restrictions on investment abroad. Most of the major American manufacturers, however, already have substantial production capacity abroad, and shouldn't be damaged too severely. Another, and more significant potential damper on American sales abroad is the growing concern in Europe over the "technology gap," which may cause resentment or resistance to American computers. Such developing economic factors as Plan Calcul and the British trend to consolidation could well decrease the potential market for U.S. products.

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COMPUTER STOCKS, ON AVERAGE, SHOW MORE GROWTH THAN SHIPMENTS;
NEW ISSUES HARD-TO-GET AND INCREASE LIKE WILDFIRE

As the figures indicate (see table on opposite page), 1967 was a banner year for stocks of computer-related companies. With only one exception -- SCM -- every stock carried in the regular EDP/IR stock listing increased during 1967. And with only two other exceptions, the listed issues gained more than 20%. Probably even more amazing is the fact that, with only two exceptions, every issue on the American Stock Exchange and Over-the-Counter gained more than 100%.

To illustrate what the year could have meant to an investor, we have calculated totals, assuming that a person held one share of each listed stock at the beginning of 1967 and disposed of it at year's end. NYSE stocks would have cost $1400 and would have increased 87.28%, those on the Amex would have cost $251 and could have been sold for a gain of over 280%, and the listed OTC stocks would have cost $312.50 and could have been sold for a gain of 231%. EDP/IR, of course, isn't recommending this as an investment technique; the results, however, are quite interesting.

During 1967, also, the market was quite receptive to new issues of companies related to the data processing industry. During the half of 1967 in which we ran our new listings page, EDP/IR carried about 60 issues, most of them new listings. As a rule, the issues were virtually impossible to obtain at the offering price, and therefore many of them quickly increased in price. Table V, below, gives a summary of some of these issues. No one can predict how 1968 will treat the computer issues, but if there's any continuation of the trend, this looks like another exciting year for investors.

TABLE V -- MARKET REACTION DURING 1967 TO NEW ISSUES FROM SELECTED FIRMS IN THE DATA PROCESSING FIELD

Company	Offering Date	Offering Price	Jan.10[1968] Bid Price	Per Cent Increase
Astrosystems, Inc.	Jan.4['68]	$ 5	$ 14	180%
Automation Technology, Inc.	Dec. 7	5	14 1/2	190
Cognitronics Corp.	Nov. 5	11	34 3/4	215
Computing & Software, Inc.	Dec. 6	47 1/2	50 1/2	6
Dearborn Computer Corp.	Dec.19	$ 15 1/2	$ 21 7/8	41%
Electronic Modules Corp.	Nov. 2	11	16 5/8	50
Essex Systems Co. Inc.	Dec.12	8 1/2	19	122
Graphic Sciences Inc.	Sept.12	10	34 1/2	245
Hudson Leasing Corp.	Nov.21	$ 13 1/2	$ 15 7/8	17%
Information Displays Inc.	July 27	5	16 1/4	222
National Computer Analysts Inc.	Aug.29	5	10	100
National Computer Services Corp.	Dec.20	1 1/2	3 5/8	138
Scan-Data Corp.	Dec. 8	$ 7 1/2	$ 39	420%
Scientific Control Corp.	Dec.26	7 1/2	23	208
Statistics for Management Data Processing Corp.	Dec. 5	5 1/2	19	246
Wang Laboratories Inc.	Aug.23	12 1/2	60	380

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STOCK MARKET RECORD FOR 1967

NEW YORK STOCK EXCHANGE	1967 High	1967 Low	Close 12/30/66	Close 12/29/67	Year Net Change	Year % Change
Addressograph-Multigraph	80 1/4	46 7/8	49 7/8	79 3/8	+ 29 1/2	+ 60.20
American R & D	195	37 3/4	40	191	+151	+377.50
Ampex Corporation	40 3/4	22 3/4	24	35 5/8	+ 11 5/8	+ 48.44
Burroughs	192	80 7/8	87 3/4	185 3/8	+ 98 1/8	+111.82
Collins Radio	114 7/8	53	58 3/8	99	+ 40 5/8	+ 69.59
Control Data	165 5/8	33 1/2	32 3/8	136 1/2	+104 1/8	+321.62
Electronic Associates	30 1/4	16 3/4	16 1/2	23	+ 6 1/2	+ 21.21
General Electric	115 7/8	82 1/2	88 1/2	96	+ 7 1/2	+ 8.47
Honeywell	117 7/8	63 1/2	66 3/8	108 7/8	+ 42 3/4	+ 64.41
IBM	648	362 1/2	371 1/2	627	+255 1/2	+ 68.77
ITT	124	72 1/2	72 5/8	116	+ 43 3/8	+ 59.72
Litton	120 3/8	79 1/2	81 3/8	104 3/4	+ 23 3/8	+ 28.73
National Cash Register	136 5/8	67 1/8	67 5/8	133 3/4	+ 66 1/8	+ 97.78
RCA	65 1/2	42 5/8	42 3/4	53 3/8	+ 10 5/8	+ 24.85
Raytheon	117	49	53	105 1/4	+ 52 1/4	+ 98.58
+ Sanders	77 1/4	28 1/4	28 1/4	65	+ 36 3/4	+130.08
Scientific Data Systems	152 3/4	44	44	136 1/4	+ 92 1/4	+209.66
SCM	82 1/4	43 1/2	56 7/8	54 1/2	- 2 3/8	- 4.17
Singer	80 1/4	45	46	68 7/8	+ 22 7/8	+ 49.73
Sperry Rand	65 1/8	28 1/8	29 3/4	63 7/8	+ 44 1/8	+148.32
+ Teledyne	143	42 1/2	42 1/2	139 1/4	+ 96 3/4	+227.65
TOTALS (ASSUMING ONE SHARE OF EACH STOCK OWNED)			1,400	2,622 5/8	1,222 5/8	+ 87.28

AMERICAN STOCK EXCHANGE

Audio Devices	30 3/8	20	22	28 3/4	+ 6 3/4	+ 30.68
Automatic DP	68 1/2	23 1/2	25 3/4	64 3/8	+ 38 5/8	+150.00
Bunker-Ramo	21 7/8	7 1/2	7 7/8	17 1/8	+ 9 1/4	+117.46
+ Cal Comp	45 5/8	15 1/4	15 1/4	44 7/8	+ 29 5/8	+194.26
Clary	19 1/2	4 1/8	4	18 7/8	+ 14 7/8	+371.87
Computer Applications	47 3/8	14	14 1/2	42 1/2	+ 28	+193.10
+ Computer Sciences	67 5/8	11	11	62 1/4	+ 51 1/4	+465.90
Digital Equipment	156	29 3/8	30 1/8	144 1/4	+114 1/8	+378.84
Leasco	139 3/4	33 5/8	34 1/2	137 1/2	+103	+298.55
Levin-Townsend	75 1/8	10 7/8	12	74 1/4	+ 62 1/4	+518.75
Milgo Electronics	15 5/8	5 1/8	5 1/8	14 1/8	+ 9	+175.61
Mohawk Data Sciences	198 1/2	32 1/4	32 1/4	170	+137 3/4	+427.13
+ Planning Research	51	10	10	43	+ 33	+333.33
Potter Instrument	40 1/2	12 3/8	13 3/4	37 5/8	+ 23 7/8	+173.63
+ Randolph Computer	55 3/4	7 7/8	7 7/8	53 7/8	+ 46	+584.13
TOTALS (ASSUMING ONE SHARE OF EACH STOCK OWNED)			251	955 3/8	+704 3/8	+280.63

OVER-THE-COUNTER	1967 High Bid	1967 Low Bid	12/30/66 Closing Bid	12/29/67 Closing Bid	Bid Price Change	1967 % Price Change
Applied Data Research	30	3 1/8	4 1/2	25	+ 20 1/2	+455.55
Aries Corporation	30 1/2	11 1/8	8 3/4	24 1/2	+ 15 3/4	+180.00
Bolt, Beranek & Newman	30	8 1/4	9 3/8	28	+ 18 5/8	+198.67
Computer Usage	72	20 1/4	21 1/4	63	+ 41 3/4	+196.47
Cyber-tronics	17 1/2	4 3/4	4 3/4	15 3/4	+ 11	+231.58
Data Products	23 3/8	2 1/2	2 3/8	20 5/8	+ 18 1/4	+768.42
Digitronics	23	6	6	22	+ 16	+266.67
DPA, Inc.	16 1/4	4 1/4	4	16 5/8	+ 12 5/8	+315.62
Electronic Memories	56 1/2	12 3/4	12 1/4	48 3/4	+ 36 1/2	+297.96
Fabri-Tek	15 3/4	6	6	12 1/2	+ 6 1/2	+108.33
Informatics, Inc.	57	7 1/2	7 3/4	53	+ 45 1/4	+583.87
Management Assistance	24 3/8	10 1/8	14	15 1/8	+ 1 1/8	+ 8.04
Memorex	226	63	68	185	+117	+172.06
Optical Scanning Corp.	102	25 3/4	28 1/4	94	+ 65 3/4	+232.74
Recognition Equipment	191	48 1/2	50 1/2	169	+118 1/2	+234.65
Systems Engineering Labs	63 1/4	8 7/8	8 1/4	61 1/2	+ 53 1/4	+645.45
Tally Corporation	59	24	28	49	+ 21	+ 75.00
TBS Computer Centers	18 3/8	6 1/2	6 1/2	18 3/8	+ 11 7/8	+182.69
+ University Computing	95	22	22	97	+ 75	+340.00
TOTALS (ASSUMING ONE SHARE OF EACH STOCK OWNED)			312 1/2	1,034 1/8	+721 5/8	+231.09

+ Reflects Stock Dividend or Split

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MONTHLY COMPUTER CENSUS

The number of electronic computers installed or on order at any one time has been increasing rapidly during the past several years. New models come on the computer market, familiar machines go out of production and subsequently are sold on the used machine market or retired from active use and dismantled. Some computers have been received with open arms by users; others have been given the cold shoulder.

To aid our readers in keeping up with this rapidly changing profile of computer use, **EDP Industry Report** publishes this census, with the status of general-purpose electronic digital computers, made by U.S.-based companies, as of the first of each month. Computers with an average system purchase price of less than $25,000 are not included. The figures for total installations are broken down between those in the U.S. and those outside; only the grand total for orders is given. The figures are compiled and updated each month by the International Data Corporation, Newtonville, Mass., a market research firm that specializes in the information processing industry. The census is available only in **EDP/IR.**

In general, manufacturers in the computer industry do not *officially* release installation and on-order figures. The figures in this census are developed through a continuing market survey conducted by the International Data Corporation. The market research program includes a worldwide computer installation locator file which identifies, by customer, the installation sites of electronic computers. The resulting census counts are submitted to individual computer manufacturers for their review and voluntary confirmation.

We hope the figures in this census will serve as a useful "box-score" of progress for readers interested in following the growth of the U.S. computer industry and of the computing power it builds. Comments from readers are welcome.

AS OF JANUARY 1, 1968

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Autonetics	RECOMP II	$2495	11/58	20	8	28	X
	RECOMP III	$1495	6/61	4	2	6	X
Bunker Ramo Corp.	BR-130	$2000	10/61	113	40	153	X
	BR-133	$2400	5/64	44	18	62	2
	BR-230	$2680	8/63	11	4	15	4
	BR-300	$3000	3/59	10	8	18	X
	BR-330	$4000	12/60	10	10	20	X
	BR-340	$7000	12/63	13	6	19	X
Burroughs	205	$4600	1/54	31	3	34	X
	220	$14,000	10/58	28	2	30	X
	B100	$2800	8/64	180	26	206	9
	B200 Series	$5400	11/61	495	90	585	18
	B300 Series	$9000	7/65	300	70	370	140
	B2500	$5000	2/67	33	2	35	115
	B3500	$14,000	5/67	23	2	25	240
	B5500	$22,000	3/63	69	4	73	8
	B6500	$33,000	2/68	0	0	0	26
	B7500	$44,000	3/69	0	0	0	8
	B8500	$200,000	12/67	1	0	1	5
Control Data Corp.	G-15	$1600	7/55	283	12	295	X
	G-20	$15,500	4/61	20	2	22	X
	LGP-21	$725	12/62	162	3	165	X
	LGP-30	$1300	9/56	115	5	120	X
	RPC-4000	$1875	1/61	54	4	58	X
	160*/160A/160G	$2100/$5000/$12,000	5/60;7/61;/3/64	451	39	510	X
	924/924A	$11,000	8/61	27	1	28	X
	1604/1604A	$45,000	1/60	53	3	56	X
	1700	$3500	5/65	70	25	95	165
	3100/3150	$10,000	12/64	90	22	112	38
	3200	$14,000	5/64	48	16	64	X
	3300	$19,500	9/65	72	18	90	40
	3400	$18,000	11/64	16	4	20	X
	3500	$25,000	7/68	0	0	0	16
	3600	$48,000	6/63	33	11	44	X
	3800	$49,300	2/66	15	3	18	14
	6400/6500	$52,000	5/66	24	6	30	25
	6600	$117,000	8/64	27	5	32	17
	7600	$150,000	3/68	0	0	0	1
Digital Equipment Corp.	PDP-1	$3400	11/60	56	3	59	X
	PDP-4	$1700	8/62	50	5	55	X
	PDP-5	$900	9/63	100	11	111	X
	PDP-6	$10,000	10/64	15	5	20	..
	PDP-7	$1300	11/64	130	35	165	8
	PDP-8	$525	4/65	1070	130	1200	120
	PDP-9	$1000	12/66	90	15	105	50
	PDP-10	$7500	10/67	1	0	1	35
Electronic Associates	8400	$12,000	6/65	16	5	21	7
	640	$1200	4/67	11	2	13	21
EMR Computer Division	ASI 210	$3850	4/62	24	2	26	X
	ASI 2100	$4200	12/63	7	0	7	X
	ADVANCE 6020	$4400	4/65	14	2	16	11
	ADVANCE 6040	$5600	7/65	7	1	8	8
	ADVANCE 6050	$9000	2/66	16	4	20	9
	ADVANCE 6070	$15,000	10/65	7	0	7	5
	ADVANCE 6130	$1000	10/67	10	2	12	25
General Electric	115	$1800	12/65	300	250	550	600
	205	$2900	6/64	37	1	38	X
	210	$16,000	7/59	40	0	40	X
	215	$6000	9/63	50	3	53	X
	225	$8000	4/61	165	27	192	X
	235	$10,900	4/64	110	20	130	20
	405	$6000	11/67	3	0	3	20
	415	$9600	5/64	270	75	345	75
	425	$18,000	6/64	100	25	125	58
	435	$25,000	9/65	28	10	38	18
	625	$50,000	4/65	29	5	34	21
	635	$56,000	5/65	30	3	33	16
	645	$90,000	7/66	3	0	3	6

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AS OF JANUARY 1, 1968

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Honeywell	DDP-24	$2500	5/63	81	2	83	X
	DDP-116	$900	4/65	175	30	205	30
	DDP-124	$2050	3/66	40	16	56	30
	DDP-224	$3300	3/65	44	10	54	4
	DDP-516	$700	9/66	85	20	105	140
	H-120/125	$3500	1/66	610	110	720	220
	H-200	$8400	3/64	865	300	1165	70
	H-400	$8500	12/61	58	35	93	X
	H-800	$28,000	12/60	76	14	90	X
	H-1200/1250	$9500	2/66	185	25	210	140
	H-1400	$14,000	1/64	10	2	12	X
	H-1800	$42,000	1/64	17	4	21	X
	H-2200	$13,000	1/66	73	12	85	74
	H-4200	$20,500	3/68	0	0	0	25
	H-8200	$42,000	4/68	0	0	0	8
IBM	305	$3600	12/57	84	28	112	X
	360/20	$2500	12/65	3550	2450	6000	5500
	360/30	$8500	5/65	3600	2600	6200	3200
	360/40	$15,000	4/65	1950	650	2600	1450
	360/44	$11,000	7/66	170	40	210	170
	360/50	$28,000	8/65	640	160	800	1070
	360/65	$50,000	11/65	275	45	320	370
	360/67	$138,000	6/66	10	4	14	38
	360/75	$81,400	1/66	26	7	33	40
	360/90 Series	$140,000	11/67	1	0	1	18
	650	$4800	11/54	110	30	140	X
	1130	$1545	2/66	2020	580	2600	3950
	1401	$6480	9/60	4800	2500	7300	X
	1401-G	$2300	5/64	1700	900	2600	X
	1401-H	$1300	6/67	200	100	300	230
	1410	$17,000	11/61	565	250	815	16
	1440	$4300	4/63	2275	1375	3650	100
	1460	$10,925	10/63	1085	265	1350	X
	1620 I, II	$4000	9/60	1040	540	1580	20
	1800	$4800	1/66	250	90	340	320
	7010	$26,000	10/63	183	32	215	4
	702	$6900	2/55	6	0	6	X
	7030	$160,000	5/61	5	1	6	X
	704	$32,000	12/55	22	2	24	X
	7040	$25,000	6/63	70	50	120	2
	7044	$36,500	6/63	111	35	146	3
	705	$38,000	11/55	36	5	41	X
	7070, 2, 4	$27,000	3/60	203	100	303	X
	7080	$60,000	8/61	79	3	82	X
	709	$40,000	8/58	5	0	5	X
	7090	$63,500	11/59	20	16	36	X
	7094	$75,500	9/62	100	3	103	X
	7094 II	$82,500	4/64	134	10	144	X
National Cash Register	NCR-304	$14,000	1/60	22	0	22	X
	NCR-310	$2500	5/61	14	0	14	X
	NCR-315	$8500	5/62	440	230	670	140
	NCR-315-RMC	$12,000	9/65	67	15	82	50
	NCR-390	$1850	5/61	200	140	340	10
	NCR-500	$1500	10/65	1200	500	1700	540
Philco	1000	$7010	6/63	15	1	16	X
	2000-210, 211	$40,000	10/58	14	2	16	X
	2000-212	$52,000	1/63	11	1	12	X
Radio Corp. of America	RCA 301	$7000	2/61	415	210	625	X
	RCA 3301	$17,000	7/64	67	8	75	X
	RCA 501	$14,000	6/59	87	2	89	X
	RCA 601	$35,000	11/62	3	0	3	X
	Spectra 70/15	$4100	9/65	130	50	180	127
	Spectra 70/25	$6700	9/65	80	20	100	57
	Spectra 70/35	$10,400	1/67	52	10	62	140
	Spectra 70/45	$22,000	11/65	85	15	100	95
	Spectra 70/46	$33,400	9/68	0	0	0	4
	Spectra 70/55	$33,300	11/66	9	0	9	17
Raytheon	250	$1200	12/60	120	52	172	X
	440	$3500	3/64	18	2	20	X
	520	$3200	10/65	25	3	28	3
Scientific Control Corp.	650	$500	5/66	21	2	23	33
	655	$1800	10/66	4	0	4	12
	660	$2000	10/65	4	0	4	0
	670	$2600	5/66	1	0	1	0
	6700	$30,000	10/67	0	0	0	1
Scientific Data Systems	SDS-92	$1500	4/65	120	6	126	9
	SDS-910	$2000	8/62	215	15	230	20
	SDS-920	$2900	9/62	180	8	188	15
	SDS-925	$3000	12/64	56	2	58	15
	SDS-930	$3400	6/64	212	20	232	20
	SDS-940	$10,000	4/66	21	0	21	21
	SDS-9300	$7000	11/64	34	2	36	5
	Sigma 2	$1000	12/66	58	2	60	170
	Sigma 5	$6000	8/67	8	0	8	50
	Sigma 7	$12,000	12/66	11	0	11	25
Standard Computer Corp.	IC6000	$18,000	5/67	7	0	7	9
Systems Engineering Labs.	810	$1000	9/65	22	2	24	X
	810A	$900	8/66	32	3	35	32
	840	$1400	11/65	4	0	4	X
	840A	$1400	8/66	20	0	20	28
UNIVAC	I & II	$25,000	3/51 & 11/57	18	0	18	X
	III	$20,000	8/62	48	13	61	X
	File Computers	$15,000	8/56	10	0	10	X
	SS 80,90 & Step	$8000	8/58	120	76	196	X
	418	$11,000	6/63	90	46	136	20
	490 Series	$23,000	12/61	171	24	195	40
	1004	$1900	2/63	1975	1050	3025	25
	1005	$2400	4/66	775	300	1075	120
	1050	$8000	9/63	190	86	276	8
	1101-1105	$35,000	12/50	8	0	8	X
	1107	$55,000	10/62	22	8	30	X
	1108	$65,000	9/65	68	20	88	70
	9200	$1500	6/67	135	15	150	910
	9300	$3400	9/67	45	5	50	600
	LARC	$135,000	5/60	2	0	2	X
			TOTALS	40,159	17,532	57,691	22,707

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, customers ordering a new computer model intended to replace a computer model in the same product line may continue to use much of their current peripheral equipment, which can account for 30-70% of the value of the total computer system.

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NEW YORK STOCK EXCHANGE	1967/68 High	1967/68 Low	2 week Sales in 100's	2 week High	2 week Low	Last	2 week Net Change	2 week % Change
Addressograph-Multigraph	80 1/2	46 7/8	1039	79 1/2	72 5/8	77 3/4	+ 3/4	+0.97
American R & D	195	37 3/4	1380	177 3/4	147 1/2	168 1/4	+1 1/4	+0.75
Ampex Corp.	40 3/4	22 3/4	1988	36 1/8	33 1/8	34 7/8	-3/8	-1.06
Burroughs	198 5/8	80 7/8	1822	198 5/8	175	187 1/4	+11	+6.24
Collins Radio	114 7/8	53	1285	94 5/8	84	84 1/4	-10 3/4	-11.32
Control Data	165 5/8	33 1/2	4366	143 1/4	130 3/4	132 1/4	-2 3/8	-1.76
Electronic Assoc.	30 1/4	16 3/4	1107	24 1/8	21 1/2	22	-1 1/8	-4.86
General Electric	115 7/8	82 1/2	2416	100	92 7/8	93 3/8	-2 5/8	-2.73
Honeywell	117 7/8	63 1/2	1763	103 3/4	97	97 1/2	-2 3/8	-2.38
IBM	648	362 1/2	1034	626	594	621	+28	+4.72
Inter. Tel. & Tel.	124	72 1/2	1963	112 1/8	102 1/8	106	-7	-6.19
Litton	120 3/8	79 1/2	3285	100 3/4	92 3/8	92 7/8	-7	-7.01
Nat. Cash Reg.	136 5/8	67 1/8	990	123	114 1/4	118 1/2	-1 1/4	-1.04
RCA	65 1/2	42 5/8	6097	53 5/8	50	50 7/8	-1/4	-0.49
Raytheon	117	49	1806	104	89 1/4	89 3/4	-13 5/8	-13.18
Sanders	77 1/4	37 5/8	2940	61 1/2	53 5/8	54 1/2	-5 3/8	-8.98
Scientific Data	152 3/4	70 3/8	1464	143 1/4	125	136	+4	+3.03
SCM	82 1/4	43 1/2	4527	61 1/4	54 1/8	58 7/8	+2 3/4	+4.90
Singer	80 1/4	45	1458	67 3/4	63 5/8	67 1/8	+3 1/8	+4.88
Sperry Rand	65 1/8	28 1/8	8455	57	52 1/2	54 1/4	-1 1/2	-2.69
Teledyne	143 7/8	93 3/4	2445	143 7/8	128	130	-5	-3.70
NYSE COMPUTER STOCK AVERAGE							-0.46	-2.00
AMERICAN STOCK EXCHANGE								
Audio Devices, Inc.	33 1/8	20	971	33 1/8	26 7/8	32 7/8	+6 1/4	+23.47
Automatic D P	68 1/2	41 1/2	460	63 1/4	53 1/4	60 1/2	+2 7/8	+4.99
Bunker-Ramo	21 7/8	7 1/2	3806	18 5/8	15 1/2	16 5/8	--	--
Cal Comp	46 3/4	34	1205	43 3/8	38 1/8	40 3/8	-1 1/8	-2.71
Clary	19 1/2	4 1/8	797	18 1/2	16 3/4	18 1/2	+5/8	+3.50
Computer Applications	47 3/8	14	1333	41 5/8	36	37 7/8	-1/4	-0.66
Computer Sciences	67 5/8	18	2133	58 3/8	51 3/4	53 3/8	-3/4	-1.39
Data Proc. Fin. & Gen.	184	52 1/8	4157	184	117 1/2	176 1/2	+58 3/4	+49.89
Digital Equipment	156	29 3/8	605	127 1/2	115 1/4	122 1/8	-2 1/8	-1.71
Elect. Comp. Prog. In.	59 3/4	39 1/8	141	50 3/8	45 7/8	47 3/8	-1 5/8	-3.32
G C Computer Corp.	41	23 1/4	1451	33 3/4	30 1/4	30 1/4	-3/4	-2.42
Leasco	146 1/4	33 5/8	878	146 1/4	115 1/8	136 1/2	+18 1/2	+15.68
Levin-Townsend Comp. Corp.	77	10 7/8	2298	72 1/2	62 1/4	67 3/8	+2 1/8	+3.26
Milgo Elect.	23 1/8	5 1/8	1941	23 1/8	15	21	+3 7/8	+22.63
Mohawk Data Sciences	198 1/2	147	1076	165 1/4	148	160 1/4	-2	-1.23
Planning Research	51	27 5/8	538	43 7/8	36 5/8	41 3/8	+2 3/8	+6.09
Potter Instrument	40 1/2	12 3/8	1205	35 7/8	31 7/8	33 5/8	-1 3/8	-3.93
Randolph Comp.	55 3/4	32 1/4	1985	54 1/2	43 1/2	53 1/8	+4 5/8	+9.54
AMSE COMPUTER STOCK AVERAGE							+5.00	+6.75

OVER-THE-COUNTER	1967/68 High Bid	1967/68 Low Bid	January 19 Bid	January 19 Asked	2 week ago Bid	2 week net change Bid	2 week % change Bid
Applied Data Research, Inc.	30	3 1/8	28	30	20 1/2	+7 1/2	+36.58
Aries Corp.	30 1/2	12 3/4	20 1/2	21 1/4	21	-1/2	-2.38
Bolt, Beranek, & Newman, Inc.	30	8 1/4	22 3/4	23 1/4	25 1/4	-2 1/2	-9.90
Computer Usage	72	20 1/4	56	57 1/2	59	-3	-5.08
Cyber-tronics	19	4 3/4	18 1/2	19	17 5/8	+7/8	+4.96
Data Products	23 3/8	2 1/2	18 5/8	19	18 7/8	-1/4	-1.32
Digitronics	27 1/2	6	20 1/4	21	21 1/2	-1 1/4	-5.81
DPA, Inc.	17 3/8	4 1/4	17 3/8	17 7/8	14 3/4	+2 5/8	+17.79
Electronic Memories	57 1/2	12 3/4	57	58	49 1/4	+7 3/4	+17.51
Fabri-Tek	15 3/4	6	11 1/2	12	13	-1 1/2	-11.54
Informatics, Inc.	59 1/2	7 1/2	58 1/2	60	53 1/2	+5	+9.35
LMC Data, Inc.	16	7 3/8	16	16 1/2	13	+3	+23.08
Management Assistance	24 3/8	10 1/8	14 5/8	15	15 1/4	-5/8	-4.10
Memorex	226	63	201	204	177	+24	+13.56
Optical Scanning Corp.	102	25 3/4	94	96	85 1/2	+8 1/2	+9.94
Recognition Equipment Inc.	191	48 1/2	188	193	168	+20	+11.90
Standard Computers	47 1/2	18	44	46	39	+5	+12.82
Systems Engineering Labs.	63 1/4	8 7/8	59 1/2	61	55	+4 1/2	+8.18
Tally Corp.	59	24	47	48 1/2	46	+1	+2.17
TBS Computer Centers Corp.	18 3/4	6 1/2	18	19	17 1/2	+1/2	+2.86
University Computing	95	72	86	88	79	+7	+8.86

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